Contemporary Mathematics
for Business and Consumers

8th Edition

Robert Brechner and George Bergeman

EIGHTH EDITION

Contemporary Mathematics for Business and Consumers

ROBERT A. BRECHNER

Miami-Dade College

GEORGE W. BERGEMAN

Northern Virginia Community College

CENGAGE Learning®

Australia • Brazil • Japan • Korea • Mexico • Singapore • Spain • United Kingdom • United States

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

This is an electronic version of the print textbook. Due to electronic rights restrictions, some third party content may be suppressed. Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. The publisher reserves the right to remove content from this title at any time if subsequent rights restrictions require it. For valuable information on pricing, previous editions, changes to current editions, and alternate formats, please visit www.cengage.com/highered to search by ISBN#, author, title, or keyword for materials in your areas of interest.

Important Notice: Media content referenced within the product description or the product text may not be available in the eBook version.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Contemporary Mathematics for Business and Consumers, Eighth Edition

Robert A. Brechner and George W. Bergeman

Vice President, General Manager: Science, Math and Quantitative Business: Balraj Kalsi

Product Director: Michael Schenk

Product Team Manager: Joe Sabatino

Product Manager: Aaron Arnsparger

Content Developer: Conor Allen

Content Developer: Chris Valentine

Senior Marketing Manager: Nathan Anderson

Content Project Manager: Jana Lewis

Manufacturing Planner: Ron Montgomery

Production Service: SPi Global

Sr. Art Director: Michelle Kunkler

Internal Designer: Lou Ann Thesing

Cover Designer: Beckmeyer Designer

Cover Image: Markus Gann

Intellectual Property

Analyst: Brittani Morgan

Project Manager: Nick Barrows

© 2017, 2015 Cengage Learning

WCN: 02-200-208

ALL RIGHTS RESERVED. No part of this work covered by the copyright herein may be reproduced, transmitted, stored, or used in any form or by any means graphic, electronic, or mechanical, including but not limited to photocopying, recording, scanning, digitizing, taping, Web distribution, information networks, or information storage and retrieval systems, except as permitted under Section 107 or 108 of the 1976 United States Copyright Act, without the prior written permission of the publisher.

For product information and technology assistance, contact us at
Cengage Learning Customer & Sales Support, 1-800-354-9706

For permission to use material from this text or product, submit all requests online at **www.cengage.com/permissions**
Further permissions questions can be emailed to
permissionrequest@cengage.com

Unless otherwise noted, all items are © Cengage Learning.

Library of Congress Control Number: 2015946505

ISBN: 978-1-305-58544-7

Cengage Learning
20 Channel Center Street
Boston, MA 02210
USA

Cengage Learning is a leading provider of customized learning solutions with employees residing in nearly 40 different countries and sales in more than 125 countries around the world. Find your local representative at **www.cengage.com.**

Cengage Learning products are represented in Canada by Nelson Education, Ltd.

To learn more about Cengage Learning Solutions, visit **www.cengage.com.**

Purchase any of our products at your local college store or at our preferred online store **www.cengagebrain.com.**

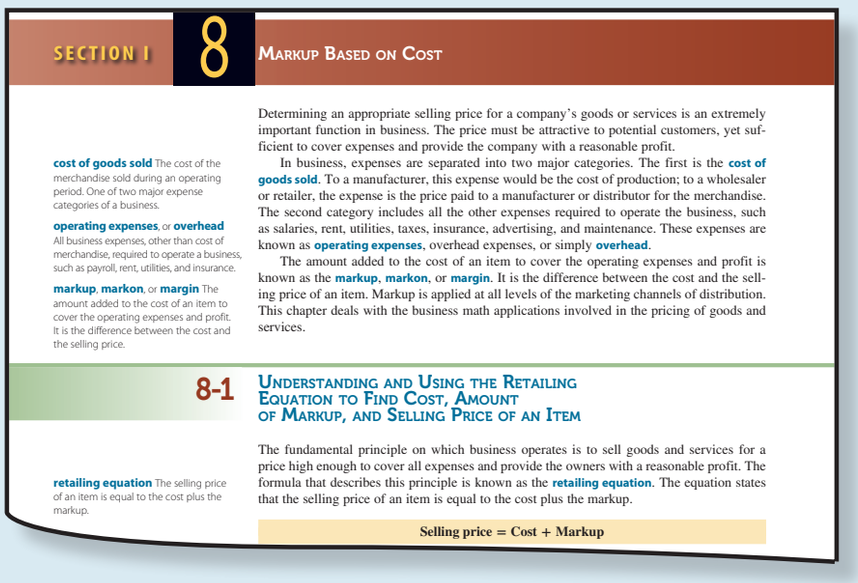
Printed in the United States of America

Print Number: 01 Print Year: 2015

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Contemporary Mathematics, 8e
Real Business. Real Math. Real Life.

***Contemporary Mathematics, 8e* helps students overcome math anxiety and confidently master key business and mathematics concepts!**



SECTION 1 **8** MARKUP BASED ON COST

cost of goods sold The cost of the merchandise sold during an operating period. One of two major expense categories of a business.

operating expenses, or **overhead** All business expenses, other than cost of merchandise, required to operate a business, such as payroll, rent, utilities, and insurance.

markup, **markon**, or **margin** The amount added to the cost of an item to cover the operating expenses and profit. It is the difference between the cost and the selling price.

Determining an appropriate selling price for a company's goods or services is an extremely important function in business. The price must be attractive to potential customers, yet sufficient to cover expenses and provide the company with a reasonable profit.

In business, expenses are separated into two major categories. The first is the **cost of goods sold**. To a manufacturer, this expense would be the cost of production; to a wholesaler or retailer, the expense is the price paid to a manufacturer or distributor for the merchandise. The second category includes all the other expenses required to operate the business, such as salaries, rent, utilities, taxes, insurance, advertising, and maintenance. These expenses are known as **operating expenses**, overhead expenses, or simply **overhead**.

The amount added to the cost of an item to cover the operating expenses and profit is known as the **markup**, **markon**, or **margin**. It is the difference between the cost and the selling price of an item. Markup is applied at all levels of the marketing channels of distribution. This chapter deals with the business math applications involved in the pricing of goods and services.

8-1 UNDERSTANDING AND USING THE RETAILING EQUATION TO FIND COST, AMOUNT OF MARKUP, AND SELLING PRICE OF AN ITEM

retailing equation The selling price of an item is equal to the cost plus the markup.

The fundamental principle on which business operates is to sell goods and services for a price high enough to cover all expenses and provide the owners with a reasonable profit. The formula that describes this principle is known as the **retailing equation**. The equation states that the selling price of an item is equal to the cost plus the markup.

Selling price = Cost + Markup

From Motivation to Mastery

Brechner's **accessible and engaging style** begins with a business-oriented review of basic math operations, including whole numbers, fractions, and decimals. After students master these operations, they move to basic equations and their use in solving business problems. These tools form a strong foundation enabling students to succeed as they study the wide range of business math topics presented in subsequent chapters.

Reflecting the Latest in Real Business

Brechner incorporates numerous **realistic** and **current** problems that are designed to develop problem-solving and critical thinking skills.

- Coverage of personal finances addresses the newest ways to manage finances, including online bills and banking, debit cards, and e-management of accounts.
- Realistic business and government forms, checks, bank statements, financial statements, credit card statements, and invoices are featured throughout.
- Stock, bond, and mutual fund tables are taken from *The Wall Street Journal Online*.

Step into the Real Business World

Brechner's unique modular approach **breaks each chapter into separate learning components**, allowing you to customize the material and order of coverage to meet the specific learning needs of your students.

CENGAGENOW

Enhance Student Learning

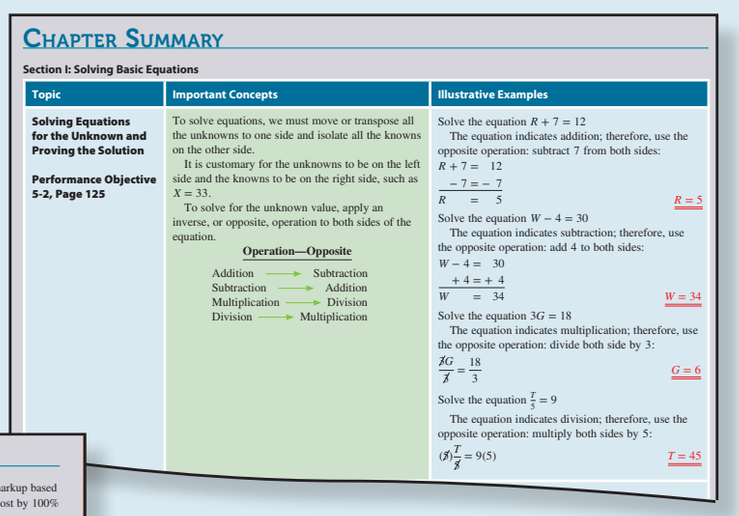
Delivering both assessment and instruction, **CengageNOW™** delivers robust course management along with powerful assessment and instructional components. These components include pre-tests which generate a personalized study plan complete with step-wise interactive guide problems and videos by author George Bergeman. Assessment and instruction is further facilitated by algorithmic review exercises, algorithmic problems tied to each objective (complete with step-by-step solutions), and a full-featured test bank.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Additional Features and Tools Further Prepare Students for the Real World

End-of-Chapter Features

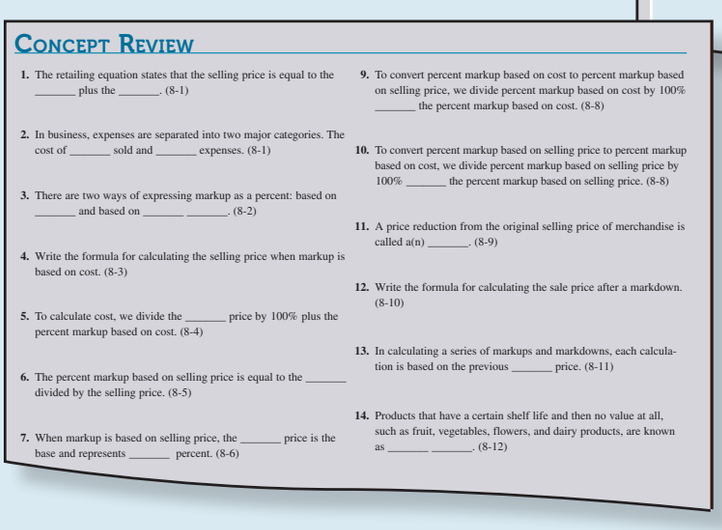
- A **Chapter Summary Chart** provides a comprehensive review of each performance objective. The chart emphasizes important chapter concepts, steps, formulas, and illustrative examples with worked-out solutions.



Chapter Summary

Section I: Solving Basic Equations

Topic	Important Concepts	Illustrative Examples
Solving Equations for the Unknown and Proving the Solution **Performance Objective 5-2, Page 125**	To solve equations, we must move or transpose all the unknowns to one side and isolate all the knowns on the other side. It is customary for the unknowns to be on the left side and the knowns to be on the right side, such as $X = 33$. To solve for the unknown value, apply an inverse, or opposite, operation to both sides of the equation. **Operation—Opposite** Addition ⟶ Subtraction Subtraction ⟶ Addition Multiplication ⟶ Division Division ⟶ Multiplication	Solve the equation $R + 7 = 12$ The equation indicates addition; therefore, use the opposite operation: subtract 7 from both sides: $R + 7 = 12$ $-7 = -7$ $R = 5$ $R = 5$ Solve the equation $W - 4 = 30$ The equation indicates subtraction; therefore, use the opposite operation: add 4 to both sides: $W - 4 = 30$ $+4 = +4$ $W = 34$ $W = 34$ Solve the equation $3G = 18$ The equation indicates multiplication; therefore, use the opposite operation: divide both side by 3: $\frac{3G}{3} = \frac{18}{3}$ $G = 6$ Solve the equation $\frac{T}{5} = 9$ The equation indicates division; therefore, use the opposite operation: multiply both sides by 5: $(5)\frac{T}{5} = 9(5)$ $T = 45$



Concept Review

1. The retailing equation states that the selling price is equal to the _____ plus the _____. (8-1)
2. In business, expenses are separated into two major categories. The cost of _____ sold and _____ expenses. (8-1)
3. There are two ways of expressing markup as a percent: based on _____ and based on _____ _____. (8-2)
4. Write the formula for calculating the selling price when markup is based on cost. (8-3)
5. To calculate cost, we divide the _____ price by 100% plus the percent markup based on cost. (8-4)
6. The percent markup based on selling price is equal to the _____ divided by the selling price. (8-5)
7. When markup is based on selling price, the _____ price is the base and represents _____ percent. (8-6)
9. To convert percent markup based on cost to percent markup based on selling price, we divide percent markup based on cost by 100% _____ the percent markup based on cost. (8-8)
10. To convert percent markup based on selling price to percent markup based on cost, we divide percent markup based on selling price by 100% _____ the percent markup based on selling price. (8-8)
11. A price reduction from the original selling price of merchandise is called a(n) _____. (8-9)
12. Write the formula for calculating the sale price after a markdown. (8-10)
13. In calculating a series of markups and markdowns, each calculation is based on the previous _____ price. (8-11)
14. Products that have a certain shelf life and then no value at all, such as fruit, vegetables, flowers, and dairy products, are known as _____ _____. (8-12)

- **Concept Review** fill-in questions test students' comprehension of the basic concepts and important vocabulary of each chapter.

Also at the end of each chapter…

- An **Assessment Test** includes exercises with multiple parts that build on previous answers and previously-learned material to encourage critical thinking and problem-solving.
- A **Collaborative Learning Activity** provides practice working in teams while enhancing students' comprehension of the chapter topics and their relevance in real-world scenarios.

Supplemental Tools for Students

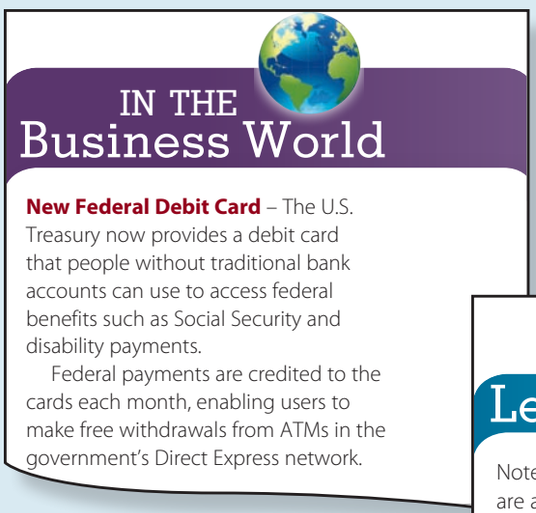
- **Jump Start Solutions** provide worked-out solutions to the first question in each new topic set in the section exercises.
- **Excel® Templates** corresponding to problems in the text are presented at three levels of difficulty.
- An **Excel® Guide and Workbook** helps students learn spreadsheet basics.
- **Author Videos** (new for this edition) by George Bergeman accompany each objective and walk students through detailed step-by-step solutions to sample problems.
- A **Financial Calculator Guide and Workbook** provides keystroke-by-keystroke instruction on using a business calculator.

Students access these tools by going to www.cengagebrain.com. Enter "Brechner" in the search box and select the appropriate text. Click the "Free Materials" tab, and then click "Access Now."

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

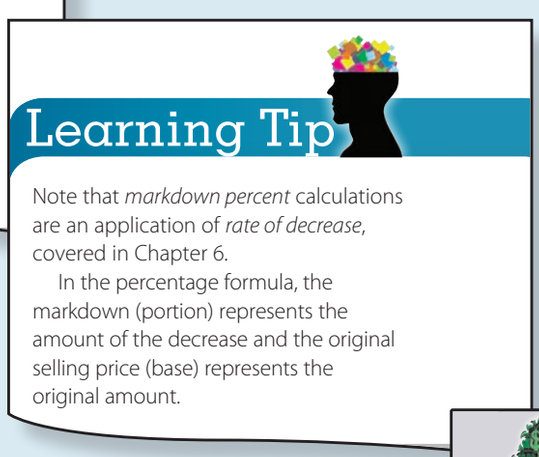
Step into the Real Business World

Special features engage students and connect business math topics to issues and concerns encountered in everyday life as well as in business settings.



In The Business World

Useful and interesting notes provide connections to the real business world. Many have useful information to help students manage their own personal finance situations.



Learning Tips

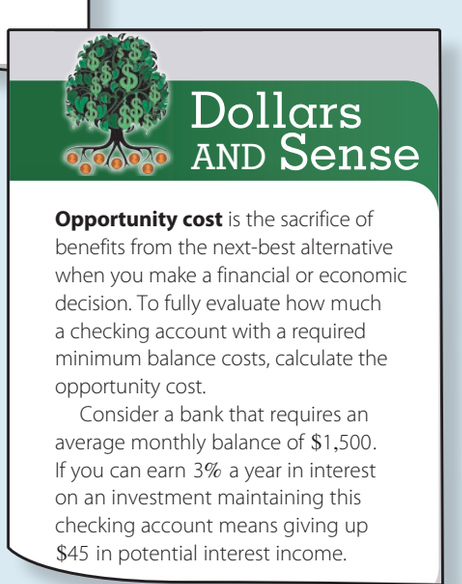
Helpful mathematical hints, shortcuts, and reminders enhance students' understanding of the chapter material.

Business Profiles

Accompanying selected exercises, photos and brief business-related profiles provide perspective, historical data, and other information to connect problems to the real world.

Business Math Journal

Appearing every three chapters, these pages provide current news items, cartoons, famous business and inspirational quotes, career information, and many other interesting facts and figures related to business topics.



Dollars and Sense

This feature stimulates student curiosity with current news items and statistics related to chapter topics. "Dollars and Sense" provides students with numerous personal finance and business money tips.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

A Proven Step-by-step Learning System Powers Learning

Each chapter is broken into discrete performance objectives. For each objective, the text guides students to mastery by way of a carefully designed learning system that includes these components:

Determining Rate of Increase or Decrease

In calculating the rate of increase or decrease of something, we use the same percentage formula concepts as before. Rate of change means percent change; therefore, the *rate* is the unknown. Once again we use the formula $R = P \div B$. Rate of change situations contain an original amount of something, which either increases or decreases to a new amount.

In solving these problems, the original amount is always the base. The amount of change is the portion. The unknown, which describes the percent change between the two amounts, is the rate.

$$\text{Rate of change (Rate)} = \frac{\text{Amount of change (Portion)}}{\text{Original amount (Base)}}$$

STEPS FOR DETERMINING THE RATE OF INCREASE OR DECREASE

STEP 1. Identify the original and the new amounts and find the *difference* between them.

STEP 2. Using the rate formula $R = P \div B$, substitute the difference from Step 1 for the portion and the original amount for the base.

STEP 3. Solve the equation for R. Remember, your answer will be in decimal form, which must be converted to a percent.

An **Explanation** of the topic

A **Step Box** clearly describing the solution steps

An **Example** with a complete step-by-step solution

EXAMPLE 16 FINDING THE RATE OF CHANGE

Last year Iberia Furniture had a work force of 360 employees. This year there are 504 employees. What is the rate of change in the number of employees?

SOLUTION STRATEGY

The key to solving this problem is to properly identify the variables. The problem asks "what is the rate?"; therefore, the rate is the unknown. The original amount, 360 employees, is the base. The difference between the two amounts, $504 - 360 = 144$, is the portion. Now apply the rate formula.

$$R = \frac{P}{B} = \frac{144}{360} = .4 = 40\%$$

40% Increase in employees

TRY IT EXERCISE 16

Solve the following problem for the rate of increase or decrease. Round to the nearest tenth of a percent when necessary.

When Mike Veteramo was promoted from supervisor to manager, he received a salary increase from $450 to $540 per week. What was the percent change in his salary?

CHECK YOUR ANSWER WITH THE SOLUTION ON PAGE 182.

A **Try-It Exercise** with solution so students can immediately test their understanding

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Acknowledgments

Contemporary Mathematics for Business and Consumers benefited from the valuable input of instructors throughout the country. We would like to especially thank those who responded to our questions about how they teach business math and those who reviewed various parts of the manuscript and/or allowed this book to be tested by their classes.

Reviewers:

Alton Amidon,
Pamlico Community College

Carol Baker,
Napa Valley
Community College

Sara Barritt,
Northeast Community College

Michael J. Batali,
Yakima Valley
Community College

Leon G. Bean,
International Business College
El Paso, Texas

Christine F. Belles,
Macomb Community College

Robert Bennett,
Delaware County
Community College

Ellen A. Benowitz,
Mercer Country
Community College

George H. Bernard,
Professor, Seminole
Community College

Tom Bilyeu,
Southwestern Illinois College

Yvonne Block,
College of Lake County

Don Boyer,
Jefferson College

Cindy Brown,
South Plains College

Sylvia Brown,
Mountain Empire
Community College

Steven Bruenjes,
Dover Business College

Barry Bunn,
Professor, Business, Valencia
Community College

Celestino Caicoya,
Miami Dade Community
College Education

Natalie Card,
Utah Valley State College

Jesse Cecil,
College of the Siskiyou

Janet P. Ciccarelli,
Professor, Herkimer County
Community College

Milton Cohen,
Fairfax Community Adult
Education

Ron Cooley,
South Suburban College

F. Bruce Creech,
Sampson Community College

Sue Courtney,
Business Professor, Kansas City,
Kansas Community College

Samantha Cox,
Wake Technical
Community College

Toby F. Deal,
Patrick Henry Community
College, Martinsville, VA

Frank DiFerdinando,
Hudson County
Community College

Mary Jo Dix,
Jamestown Business College

Elizabeth Domenico,
Gaston College

Gary M. Donnelly

J.D. Dulgeroff,
San Bernardino Valley
Community College

Donna N. Dunn,
Beaufort County
Community College

Michael E. Durkee,
San Diego Miramar
Community College

Acie B. Earl,
Black Hawk Community College

Susan Emens,
Kent State University –
Trumbull Campus

Gregory G. Fallon,
College of St. Joseph in Vermont

Marty Franklin,
Wilkes Community College

Robert S. Frye,
Polk State College

Rene Garcia,
Miami-Dade Community
College, Wolfson Campus

Patricia Gardner,
San Bernardino Valley College

Glen Gelderloos,
Grand Rapids
Community College

Cecil Green,
Riverside Community College

Stephen W. Griffin,
Tarrant County Junior College,
South Campus

James Grigsby,
Lake Sumter
Community College

Paul Grutsis,
San Bernardino Valley College

Julie Hall,
Napa Valley Community College

Giselle Halpern,
El Camino Community College

Ronnie R. Hector,
Briarcliff College

John Heinsius,
Modesto Junior College

Brenda Henry,
McLennan Community College

Jana Hosmer,
Blue Ridge Community College

Jan Ivansek,
Lakeland Community College

Diane Jacobson,
Ridley-Lowell Business &
Technical Institute

Marlyce Johnson,
Milwaukee Area
Technical College

Sherry Jones,
Glenville State College

Ed Kavanaugh,
Schoolcraft College

Deanna R. Knight,
Daytona State College

Harry T. Kolendrianos,
Danville Community College,
Danville, VA

Sky Kong,
PRCC

Phil C. Kopriva,
San Francisco Community
College District

Jeffrey Kroll,
Assistant Professor,
Brazosport College

Jeanette Landin,
Empire College

Janis Lawrence,
Northwestern
Business College

Rosemarie LeFebvre,
Mohave Community College

Darien Leiker,
Coastal Bend College Pleasanton
Campus

Linda C. Lohman,
Jefferson Community and
Technical College

Diana Lee Lloyd,
Hesser College

Gwendolyn Loftis,
Rose State College

David Loiacono,
Benedictine University

Joyellen Lottie,
Glendale Community College

Peter Lotto,
Pikes Peak Community
College

David H. Lydick,
Paul D. Camp
Community College

Marvin Mai,
Empire College

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Paul H. Martin,
Business, Aim Community College, Greeley, CO

Loretta A. McAdam,
Professor Information Systems, Business and Legal Studies, Seminole Community College

Sharon M. Meyer,
Pikes Peak Community College

Zo Miller,
Rose State College

Sakeena Mirza,
Benedicine University

Karen Mozingo,
Pitt Community College

Linda Mosley,
Coordinator/Instructor of Business Programs, Tarrant County College, Southeast Campus

Kathleen A. Murphrey,
San Antonio College

Jack L. Nelson,
Ferris State University

Angela Nino,
Richland College

Wayne A. Paper,
Hawkeye Institute of Technology

Tatyana Pashnyak,
Bainbridge College

Richard P. Paur,
Milwaukee Area Technical College

Pam Perry,
Hinds Community College

Cynthia Phipps,
Lake Land College

Lana L. Powell,
Valencia Community College

Wayne Price,
Napa Valley Community College

Robert Reagan,
Western Dakota Tech

David Rice,
Ilisagvik College

Barbara Rosenthal,
Miami-Dade Community College, Wolfson Campus

Ben Sadler,
Miami-Dade Community College, Wolfson Campus

Kim Saunders,
Tarrant County College

Charles R. Shatzer,
Solano College

Jane C Shatzer,
Solano Community College

Jo-Anne Sheehan,
Briarcliffe College

Amy Shinoki,
Kapiolani Community College

Versha Shah,
Montgomery County Community College

Catherine Skura,
Sandhills Community College

Amy Perry Smith,
Pearl River Community College

Kent Smith,
Texas State Technical College West Texas

Natalie E. Smith,
Okaloosa Walton Community College

Louise M. Stephens,
Volunteer State Community College

Carl J. Sonntag,
Pikes Peak Community College

David D. Stringer,
DeAnza College

Tyrrell Taplin,
El Centro College

Lynette Teal,
Western WI Technical College

Steven Teeter,
Utah Valley State College

Kari L. Toms

Randall Watts,
Big Sandy Community and Technical College

Charles Webb,
Miami-Dade Community College, Wolfson Campus

Mark A. Wells,
Big Sandy Community & Technical College

Andrea Williams,
Shasta College

Gregory J. Worosz,
Schoolcraft College

James T. Yamamoto,
Hawaii Business College

Mary D. Zajac,
Montgomery County Community College

Phone Survey Respondents:

Jeffrey Abrams,
Newport Business Institute

Terry Alexander,
Denver Technical College

Charles Anderson,
TN Technology Center at Livingston

David Blum,
Moraine Park Technical College

Rita Boetell,
Bakersfield College

Barry Brandbold,
Aaker's Business College

Norma Broadway,
Hinds Community College

Howard Bryan,
Santa Rosa Junior College

Bob Bulls,
J.S. Reynolds County College

Roy Bunek,
Fugazzi College

Patricia Calloway, East Mississippi County College

Lisa Campenella,
ICSI (Allentown, PA)

John H. Carpenter,
Polk Community College

Roger D. Chagnon,
Jamestown Business College

Victor Clearsuas,
Holyoke Community College

Carol Coeyman,
Yorktown Business Institute

George Converse,
Stone Academy

Ron Cooley,
South Suburban College

William S. Dahlman,
Premier Career College

Nancy Degnan,
Sawyer School

Karen Desele,
Gillette

Joe D. DiCostanzo,
Johnson County Community College

Stephen Ernest,
Baton Rouge School of Computers

Carol Ferguson,
Rock Valley College

Mark Finger,
Madison Area Technical College

Dennis Franklin,
Culinary Arts Institute

Rachael Freuche,
Indiana Business College

Rick Gallardo,
International Business College

Miriam Gateley,
Valencia Community College

Cynthia Gerber,
Indiana Business College

Jeff Gordon,
San Joaquin Valley College

Carolyn Green,
Universal Business & Media School

Bob Grenier,
Vatterott College

Ray Hale,
Rets Medical & Business Institute

Michael Hlebik,
Erie Business School

Bill Holbrook,
Owensboro Junior College of Business

Brenda Holmes,
Northwest Mississippi Community College

John Hudson,
National Business College

Jared Jay,
American Commercial College

Joanne Kaufman,
Metro Business College

Patti Koluda,
Yakima Valley County College

Janice Lawrence,
Northwestern Business College

Suzann Lewison,
Southwestern WI Technical College

Marvin Mai,
Empire College

Jackie Marshall,
Ohio Business College

Faye Massey,
Northwest Mississippi Community College

Cheryl McGahee,
Guilford Community College

Mary Jo McKinney,
American School of Business

Hugh McNiece,
Lincolnland County College

Rose Miller,
Milwaukee Area Technical College
Charlene Mulleollan,
Dubois Business College

Jim Murray,
Western WI Technical College

Steve O'Rourke,
Newcastle Business School

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Peggy Peterson,
Rasmussen College

Barbara Portzen,
Mid State Technical College

Edward Pratowski,
Dorsey Business School

Rose Ramirez,
MTL Business College of Stockton

Bill Rleodarmer,
Haywood County College

Linda Rockwall,
Ridley Lowell Business & Technical Institute

Steve Shaw,
Tidewater Tech

Susan Shaw,
Southwestern Business College

Chuck Sherryll,
Community College of Aurora

Forrest Simmons,
Portland Community College

Eileen Snyder,
Harrisburg Area Community College

Adina Solomon,
Vatterott College

Walter Soroka,
Newcastle School of Trade

Teresa Stephenson,
Indianapolis Business School

Mary Susa,
Mid-State Technical College

Kermit Swanson,
Rasmussen College

Paula Terrones,
College of Office Technology

Arthur Walter,
Suffolk Community College

Winston Wrenn,
Draughton Junior College

Gaylon Wright,
Angelina College

Sandra Young,
Business Institute of Pennsylvania

Many thanks to the academic, business, and other professionals who have provided contributions and support for the development of this text and package over many years:

Nancy Aiello
Santiago Alan
Bob Albrecht
John Aldrich
John Anderson
Vince Arenas
Marcie Bader
Christine Balmori
Robert Barton
Charlie Beavin
Jessica Bergeman
Ed Blakemore
Joan Braverman
Martha Cavalaris
Gilbert S. Cohen
Patricia Conroy
Dave Cook
Ralph Covert
Nancy De La Vega
Elliott Denner
George DiOrio
John Dunham
Ivan Figueroa
Mario Font
Butch Gemin
John Godlewski
Abdul Hamza
Lionel Howard
Scott Isenberg
Al Kahn
Joseph Kreutle
Kimberly Lipscomb
Jaime Lopez
Marvin Mai
Jane Mangrum
Jim McHugh
Noemi McPherson
Sharon Meyer
Rolando Montoya
Joseph Moutran
Sylvia Ratner
Cheryl Robinson
Brian Rochlin
Michael Rohrer
Joyce Samuels
Howard Schoninger
Steven Steidel
Bill Taylor
Richard Waldman
Joseph Walzer
Kathryn Warren
Larry Zigler

Also, thanks to the corporate and government organizations that were used as examples and sources of information in preparing and developing this book:

7-Eleven
Aamco
Ace Hardware
Aetna
Amazon.com
AMR Corporation
Ann Taylor
Apple
Arthur Andersen & Company
Auto Zone
Bank of America
Baskin & Robbins
Best Buy
Board of Governors, Federal Reserve System
Brinker International
Bureau of Labor Statistics
CarMax
Center
Chili's
Circuit City
Citicorp Financial Services
Dairy Queen
Darden Restaurants
Dell
Dominos Pizza
Dow Jones, Inc.,
The Wall Street Journal
eBay
Federal Express
General Motors/Saturn
Goodrich
Google
Harley-Davidson
Home Depot
Hotels.com
Insurance Information Institute
Internal Revenue Service
Jiffy Lube
Kellogg
KFC
Kinko's
Kodak
Long John Silver
Lowe's Home Improvement Center
Macaroni Grill
Macy's
MasterCard International
McDonald's
The Miami Herald
Microsoft
New York Times
Nike
Nissan
Office Depot
Olive Garden
On the Border
Panasonic
Pizza Hut
Popular Bank of Florida
Radio Shack
Red Lobster
Reebok, Inc.
Ryder
Sea Ray Boats
Sirius Satellite Radio
Smith Barney Shearson

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Sony
Sprint/Nextel
Starbucks
State of Florida, Department of Revenue
Taco Bell
Target
Time, Inc., Fortune Magazine
Town & Country
Toyota Motors
Toys "R" Us, Inc.
Transamerica Life Companies
Transocean
Travelocity.com
Tribune
TruValue Hardware
Tupperware
U. S. Census Bureau
U.S. Department of Commerce
U.S. Department of Housing and Urban Development
U.S. Government Printing Office, Statistical Abstract of the United States
U.S. Postal Service
U.S. Timber
U-Haul
USA Today
Wall Street Journal
Wall Street Journal Online
Wal-Mart, Inc.
Walt Disney Company
Wendy's
West Marine
XM Satellite Radio
Yum Brands

I would like to gratefully acknowledge and thank the editorial, production, and marketing teams at Cengage Learning for their insights and skillful support of the eighth edition. It has been a great pleasure working with them.

Special thanks to Aaron Arnsparger, Product Manager; Conor Allen and Chris Valentine, Content Developers; Jana Lewis, Content Project Manager; Nate Anderson, Senior Marketing Manager; and Michelle Kunkler, Senior Art Director.

Thanks to Mike Gordon and Fernando Rodriquez for their creativity, business acumen, and wonderful research.

For his vital contributions to the success of the MathCue.Business software components, I thank Michael Rohrer very much.

I also wish to convey my love and thanks to my daughter, Jessy Bergeman, for her assistance with the development of the MathCue.Business software components to accompany each of the past editions as well as her help with various aspects of the current edition of the text itself.

Bob Brechner worked tirelessly to develop the first six editions of this test, and he was both a good friend and an esteemed colleague. He is keenly missed, and I very much appreciate my good fortune in having had the opportunity to collaborate with him for more than sixteen years. I am also grateful to have the continuing support and friendship of Bob's wife, Shari Brechner, who has positively impacted this text from its very first edition.

Finally, I wish to express my love and gratitude to my wife, Clarissa. She has provided encouragement and support over many years, and I offer her my heartfelt thanks.

George Bergeman
September, 2015

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

About the Authors

Robert Brechner

Photo by Shari Brechner

Robert Brechner was Professor Emeritus, School of Business, at Miami Dade College. For 42 years he taught business math, principles of business, marketing, advertising, public relations, management, and personal finance. He was also Adjunct Professor at Florida Atlantic University, Boca Raton, International Fine Arts College, Miami, and Florida International University School of Journalism and Mass Communications.

In professional work outside the classroom, he consulted widely with industrial companies. In addition to authoring the first six editions of *Contemporary Mathematics*, Professor Brechner authored several other successful texts highlighting annuities, management, business math and applied math.

Bob and his wife, Shari, were avid travelers and enjoyed a wide range of activities together and in the company of friends. In many ways, both professional and otherwise, Bob's legacy remains an enduring inspiration for his colleagues, his friends, and his students.

George Bergeman

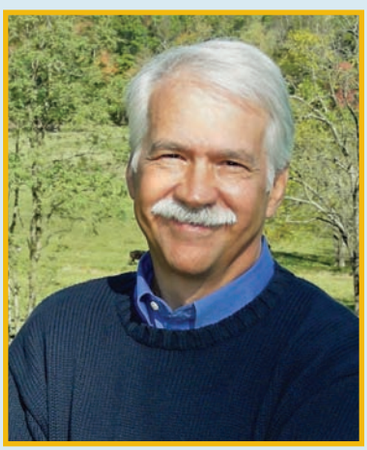


Photo by Clarissa Bergeman

George Bergeman's teaching career of over twenty-five years began at a small college in West Africa as a Peace Corps Volunteer and continued at Northern Virginia Community College, one of the largest multi-campus colleges in the country. Teaching awards included Faculty Member of the Year honors at his campus.

George is the author of numerous packages developed to provide targeted and effective support for instruction. His first package was a statistics software/workbook combination published in 1985, and since then he has developed a variety of software packages to support statistics, calculus, developmental math, and finite math including math of finance. Developing the software components formerly known as MathCue. Business for use with *Contemporary Mathematics for Business and Consumers* has been a focal point for George for more than eighteen years. During that time, he worked closely with Bob Brechner to develop and refine the package, and he coauthored the seventh and eighth editions of the text.

George lives with his wife, Clarissa, near Washington, D.C. Their daughter, Jessy, recently completed grad school in Colorado after previously working in San Francisco, Boston, and Brazil. In his free time, George enjoys accompanying his wife and their young corgi, Simon, on various adventures and on training sessions in preparation for dog shows. Other hobbies include photography and videography, and these activities frequently intersect with dog training and dog shows. Along those lines, George and his wife produced a dog-sport training video which has been distributed throughout the United States and several other countries.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

BRIEF CONTENTS

Chapter 1
Whole Numbers 1

Chapter 2
Fractions 31

Chapter 3
Decimals 64

Chapter 4
Checking Accounts 91

Chapter 5
Using Equations to Solve Business Problems 123

Chapter 6
Percents and Their Applications in Business 154

Chapter 7
Invoices, Trade Discounts, and Cash Discounts 189

Chapter 8
Markup and Markdown 229

Chapter 9
Payroll 262

Chapter 10
Simple Interest and Promissory Notes 304

Chapter 11
Compound Interest and Present Value 341

Chapter 12
Annuities 369

Chapter 13
Consumer and Business Credit 406

Chapter 14
Mortgages 451

Chapter 15
Financial Statements and Ratios 483

Chapter 16
Inventory 534

Chapter 17
Depreciation 569

Chapter 18
Taxes 599

Chapter 19
Insurance 640

Chapter 20
Investments 672

Chapter 21
Business Statistics and Data Presentation 711

Appendix A
Answers to Odd-Numbered Exercises A-2

Index I-1

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

CONTENTS

Chapter 1: Whole Numbers 1

Section I: The Decimal Number System: Whole Numbers 2

1-1 Reading and writing whole numbers in numerical and word form 2

1-2 Rounding whole numbers to a specified place value 4

Section II: Addition and Subtraction of Whole Numbers 7

1-3 Adding whole numbers and verifying your answers 7

1-4 Subtracting whole numbers and verifying your answers 9

Section III: Multiplication and Division of Whole Numbers 14

1-5 Multiplying whole numbers and verifying your answers 14

1-6 Dividing whole numbers and verifying your answers 17

Chapter 2: Fractions 31

Section I: Understanding and Working with Fractions 32

2-1 Distinguishing among the various types of fractions 32

2-2 Converting improper fractions to whole or mixed numbers 33

2-3 Converting mixed numbers to improper fractions 34

2-4 Reducing fractions to lowest terms 35

2-5 Raising fractions to higher terms 37

Section II: Addition and Subtraction of Fractions 40

2-6 Determining the least common denominator (LCD) of two or more fractions 40

2-7 Adding fractions and mixed numbers 41

2-8 Subtracting fractions and mixed numbers 43

Section III: Multiplication and Division of Fractions 49

2-9 Multiplying fractions and mixed numbers 49

2-10 Dividing fractions and mixed numbers 51

Chapter 3: Decimals 64

Section I: Understanding Decimal Numbers 65

3-1 Reading and writing decimal numbers in numerical and word form 65

3-2 Rounding decimal numbers to a specified place value 67

Section II: Decimal Numbers and the Fundamental Processes 70

3-3 Adding and subtracting decimals 70

3-4 Multiplying decimals 71

3-5 Dividing decimals 72

Section III: Conversion of Decimals to Fractions and Fractions to Decimals 78

3-6 Converting decimals to fractions 78

3-7 Converting fractions to decimals 79

Chapter 4: Checking Accounts 91

Section I: Understanding and Using Checking Accounts 92

4-1 Opening a checking account and understanding how various forms are used 92

4-2 Writing checks in proper form 94

4-3 Endorsing checks by using blank, restrictive, and full endorsements 95

4-4 Preparing deposit slips in proper form 97

4-5 Using check stubs or checkbook registers to record account transactions 98

Section II: Bank Statement Reconciliation 105

4-6 Understanding the bank statement 105

4-7 Preparing a bank statement reconciliation 107

Chapter 5: Using Equations to Solve Business Problems 123

Section I: Solving Basic Equations 124

5-1 Understanding the concept, terminology, and rules of equations 124

5-2 Solving equations for the unknown and proving the solution 125

5-3 Writing expressions and equations from written statements 131

Section II: Using Equations to Solve Business-Related Word Problems 134

5-4 Setting up and solving business-related word problems by using equations 134

5-5 Understanding and solving ratio and proportion problems 138

Chapter 6: Percents and Their Applications in Business 154

Section I: Understanding and Converting Percents 155

6-1 Converting percents to decimals and decimals to percents 155

6-2 Converting percents to fractions and fractions to percents 157

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Section II: Using the Percentage Formula to Solve Business Problems 160

6-3 Solving for the portion 161
6-4 Solving for the rate 163
6-5 Solving for the base 165

Section III: Solving Other Business Problems Involving Percents 170

6-6 Determining rate of increase or decrease 170
6-7 Determining amounts in increase or decrease situations 173
6-8 Understanding and solving problems involving percentage points 176

Chapter 7: Invoices, Trade Discounts, and Cash Discounts 189

Section I: The Invoice 190

7-1 Reading and understanding the parts of an invoice 190
7-2 Extending and totaling an invoice 193

Section II: Trade Discounts—Single 197

7-3 Calculating the amount of a single trade discount 197
7-4 Calculating net price by using the net price factor, complement method 197
7-5 Calculating trade discount rate when list price and net price are known 198

Section III: Trade Discounts—Series 202

7-6 Calculating net price and the amount of a trade discount by using a series of trade discounts 202
7-7 Calculating the net price of a series of trade discounts by using the net price factor, complement method 203
7-8 Calculating the amount of a trade discount by using a single equivalent discount 204

Section IV: Cash Discounts and Terms of Sale 208

7-9 Calculating cash discounts and net amount due 209
7-10 Calculating net amount due, with credit given for partial payment 211
7-11 Determining discount date and net date by using various terms of sale dating methods 212

Chapter 8: Markup and Markdown 229

Section I: Markup Based on Cost 230

8-1 Understanding and using the retailing equation to find cost, amount of markup, and selling price of an item 230
8-2 Calculating percent markup based on cost 232
8-3 Calculating selling price when cost and percent markup based on cost are known 233
8-4 Calculating cost when selling price and percent markup based on cost are known 234

Section II: Markup Based on Selling Price 237

8-5 Calculating percent markup based on selling price 237
8-6 Calculating selling price when cost and percent markup based on selling price are known 238
8-7 Calculating cost when selling price and percent markup based on selling price are known 239
8-8 Converting percent markup based on cost to percent markup based on selling price, and vice versa 240

Section III: Markdowns, Multiple Operations, and Perishable Goods 244

8-9 Determining the amount of markdown and the markdown percent 244
8-10 Determining the sale price after a markdown and the original price before a markdown 245
8-11 Computing the final selling price after a series of markups and markdowns 246
8-12 Calculating the selling price of perishable goods 248

Chapter 9: Payroll 262

Section I: Employee's Gross Earnings and Incentive Pay Plans 263

9-1 Prorating annual salary on the basis of weekly, biweekly, semimonthly, and monthly pay periods 263
9-2 Calculating gross pay by hourly wages, including regular and overtime rates 264
9-3 Calculating gross pay by straight and differential piecework schedules 265
9-4 Calculating gross pay by straight and incremental commission, salary plus commission, and drawing accounts 267

Section II: Employee's Payroll Deductions 273

9-5 Computing FICA taxes, both social security and medicare, withheld from an employee's paycheck 273
9-6 Calculating an employee's federal income tax (FIT) withholding by the percentage method 275
9-7 Determining an employee's total withholding for federal income tax, social security, and Medicare using the combined wage bracket tables 278

Section III: Employer's Payroll Expenses and Self-Employed Person's Tax Responsibility 283

9-8 Computing FICA tax for employers and self-employment tax for self-employed persons 283
9-9 Computing the amount of state unemployment tax (SUTA) and federal unemployment tax (FUTA) 285
9-10 Calculating employer's fringe benefit expenses 286
9-11 Calculating quarterly estimated tax for self-employed persons 287

Chapter 10: Simple Interest and Promissory Notes 304

Section I: Understanding and Computing Simple Interest 305

10-1 Computing simple interest for loans with terms of years or months 305
10-2 Calculating simple interest for loans with terms of days by using the exact interest and ordinary interest methods 306
10-3 Calculating the maturity value of a loan 308
10-4 Calculating the number of days of a loan 309
10-5 Determining the maturity date of a loan 310

Section II: Using the Simple Interest Formula 313

10-6 Solving for the principal 313
10-7 Solving for the rate 314
10-8 Solving for the time 315
10-9 Calculating loans involving partial payments before maturity 316

Section III: Understanding Promissory Notes and Discounting 322

10-10 Calculating bank discount and proceeds for a simple discount note 323
10-11 Calculating true, or effective, rate of interest for a simple discount note 324
10-12 Discounting notes before maturity 324
10-13 Purchasing U.S. Treasury bills 326

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Chapter 11: Compound Interest and Present Value 341

Section I: Compound Interest—The Time Value of Money 342

11-1 Manually calculating compound amount (future value) and compound interest 343

11-2 Computing compound amount (future value) and compound interest by using compound interest tables 344

11-3 Creating compound interest table factors for periods beyond the table 347

11-4 Calculating annual percentage yield (APY) or effective interest rate 348

11-5 Calculating compound amount (future value) by using the compound interest formula 349

Section II: Present Value 354

11-6 Calculating the present value of a future amount by using present value tables 354

11-7 Creating present value table factors for periods beyond the table 356

11-8 Calculating present value of a future amount by using the present value formula 357

Chapter 12: Annuities 369

Section I: Future Value of an Annuity: Ordinary and Annuity Due 370

12-1 Calculating the future value of an ordinary annuity by using tables 370

12-2 Calculating the future value of an annuity due by using tables 374

12-3 Calculating the future value of an ordinary annuity and an annuity due by formula 375

Section II: Present Value of an Annuity: Ordinary and Annuity Due 379

12-4 Calculating the present value of an ordinary annuity by using tables 380

12-5 Calculating the present value of an annuity due by using tables 381

12-6 Calculating the present value of an ordinary annuity and an annuity due by formula 384

Section III: Sinking Funds and Amortization 387

12-7 Calculating the amount of a sinking fund payment by table 387

12-8 Calculating the amount of an amortization payment by table 389

12-9 Calculating sinking fund payments by formula 389

12-10 Calculating amortization payments by formula 390

Chapter 13: Consumer and Business Credit 406

Section I: Open-End Credit—Charge Accounts, Credit Cards, and Lines of Credit 407

13-1 Calculating the finance charge and new balance by using the unpaid or previous month's balance method 408

13-2 Calculating the finance charge and new balance by using the average daily balance method 412

13-3 Calculating the finance charge and new balance of business and personal lines of credit 414

Section II: Closed-End Credit—Installment Loans 421

13-4 Calculating the total deferred payment price and the amount of the finance charge of an installment loan 421

13-5 Calculating the regular monthly payments of an installment loan by the add-on interest method 423

13-6 Calculating the annual percentage rate of an installment loan by APR tables and by formula 424

13-7 Calculating the finance charge and monthly payment of an installment loan by using the APR tables 429

13-8 Calculating the finance charge rebate and the payoff for loans paid off early by using the sum-of-the-digits method 430

Chapter 14: Mortgages 451

Section I: Mortgages—Fixed-Rate and Adjustable-Rate 452

14-1 Calculating the monthly payment and total interest paid on a fixed-rate mortgage 453

14-2 Preparing a partial amortization schedule of a mortgage 455

14-3 Calculating the monthly PITI of a mortgage loan 457

14-4 Understanding closing costs and calculating the amount due at closing 458

14-5 Calculating the interest rate of an adjustable-rate mortgage (ARM) 461

Section II: Second Mortgages—Home Equity Loans and Lines of Credit 467

14-6 Calculating the potential amount of credit available to a borrower 467

14-7 Calculating the housing expense ratio and the total obligations ratio of a borrower 468

Chapter 15: Financial Statements and Ratios 483

Section I: The Balance Sheet 484

15-1 Preparing a balance sheet 485

15-2 Preparing a vertical analysis of a balance sheet 488

15-3 Preparing a horizontal analysis of a balance sheet 490

Section II: The Income Statement 496

15-4 Preparing an income statement 496

15-5 Preparing a vertical analysis of an income statement 499

15-6 Preparing a horizontal analysis of an income statement 501

Section III: Financial Ratios and Trend Analysis 506

15-7 Calculating financial ratios 506

15-8 Preparing a trend analysis of financial data 510

Chapter 16: Inventory 534

Section I: Inventory Valuation 535

16-1 Pricing inventory by using the first-in, first-out (FIFO) method 536

16-2 Pricing inventory by using the last-in, first-out (LIFO) method 538

16-3 Pricing inventory by using the average cost method 540

16-4 Pricing inventory by using the lower-of-cost-or-market (LCM) rule 541

Section II: Inventory Estimation 546

16-5 Estimating the value of ending inventory by using the retail method 546

16-6 Estimating the value of ending inventory by using the gross profit method 548

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Section III: Inventory Turnover and Targets 552

16-7 Calculating inventory turnover rate at retail 553
16-8 Calculating inventory turnover rate at cost 554
16-9 Calculating target inventories based on industry standards 555

Chapter 17: Depreciation 569

Section I: Traditional Depreciation—Methods Used for Financial Statement Reporting 570

17-1 Calculating depreciation by the straight-line method 570
17-2 Calculating depreciation by the sum-of-the-years' digits method 572
17-3 Calculating depreciation by the declining-balance method 574
17-4 Calculating depreciation by the units-of-production method 576

Section II: Asset Cost Recovery Systems—IRS-Prescribed Methods for Income Tax Reporting 582

17-5 Calculating depreciation by using the Modified Accelerated Cost Recovery System (MACRS) 582
17-6 Calculating the periodic depletion cost of natural resources 586

Chapter 18: Taxes 599

Section I: Sales and Excise Taxes 600

18-1 Determining sales tax by using sales tax tables 600
18-2 Calculating sales tax by using the percent method 602
18-3 Calculating selling price and amount of sales tax when total purchase price is known 603
18-4 Calculating excise tax 603

Section II: Property Tax 606

18-5 Calculating the amount of property tax 606
18-6 Calculating tax rate necessary in a community to meet budgetary demands 609

Section III: Income Tax 612

18-7 Calculating taxable income for individuals 612
18-8 Using the Tax Table to determine tax liability 615
18-9 Using the Tax Computation Worksheet to calculate tax liability 621
18-10 Calculating an individual's tax refund or amount of tax owed 624
18-11 Calculating corporate income tax and net income after taxes 625

Chapter 19: Insurance 640

Section I: Life Insurance 641

19-1 Understanding life insurance and calculating typical premiums for various types of policies 642
19-2 Calculating the value of various nonforfeiture options 645
19-3 Calculating the amount of life insurance needed to cover dependents' income shortfall 647

Section II: Property Insurance 650

19-4 Understanding property insurance and calculating typical fire insurance premiums 650
19-5 Calculating premiums for short-term policies and the refunds due on canceled policies 652
19-6 Understanding coinsurance and computing compensation due in the event of a loss 654
19-7 Determining each company's share of a loss when liability is divided among multiple carriers 655

Section III: Motor Vehicle Insurance 658

19-8 Understanding motor vehicle insurance and calculating typical premiums 658
19-9 Computing the compensation due following an accident 661

Chapter 20: Investments 672

Section I: Stocks 673

20-1 Understanding stocks and distributing dividends on preferred and common stock 673
20-2 Reading a stock quotation table 676
20-3 Calculating current yield of a stock 678
20-4 Determining the price-earnings ratio of a stock 679
20-5 Computing the cost, proceeds, and gain (or loss) on a stock transaction 680

Section II: Bonds 685

20-6 Understanding bonds and reading a bond quotation table 685
20-7 Calculating the cost of purchasing bonds and the proceeds from the sale of bonds 688
20-8 Calculating the current yield of a bond 690

Section III: Mutual Funds 692

20-9 Understanding mutual funds and reading a mutual fund quotation table 692
20-10 Calculating the sales charge and sales charge percent of a mutual fund 694
20-11 Calculating the net asset value of a mutual fund 695
20-12 Calculating the number of shares purchased of a mutual fund 695
20-13 Calculating return on investment 696

Chapter 21: Business Statistics and Data Presentation 711

Section I: Data Interpretation and Presentation 712

21-1 Reading and interpreting information from a table 712
21-2 Reading and constructing a line chart 714
21-3 Reading and constructing a bar chart 718
21-4 Reading and constructing a pie chart 724

Section II: Measures of Central Tendency and Dispersion—Ungrouped Data 731

21-5 Calculating the arithmetic mean of ungrouped data 731
21-6 Determining the median 732
21-7 Determining the mode 733
21-8 Determining the range 734

Section III: Frequency Distributions—Grouped Data 737

21-9 Constructing a frequency distribution 737
21-10 Calculating the mean of grouped data 738
21-11 Preparing a histogram of a frequency distribution 739

Appendix A: Answers to Odd-Numbered Exercises A-2

Index I-1

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

CHAPTER 1 Whole Numbers

Performance Objectives

SECTION I: The Decimal Number System: Whole Numbers

1-1: Reading and writing whole numbers in numerical and word form (p. 2)

1-2: Rounding whole numbers to a specified place value (p. 4)

SECTION II: Addition and Subtraction of Whole Numbers

1-3: Adding whole numbers and verifying your answers (p. 7)

1-4: Subtracting whole numbers and verifying your answers (p. 9)

SECTION III: Multiplication and Division of Whole Numbers

1-5: Multiplying whole numbers and verifying your answers (p. 14)

1-6: Dividing whole numbers and verifying your answers (p. 17)

© senk/Shutterstock.com

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

SECTION I 1 The Decimal Number System: Whole Numbers

Numbers are one of the primary tools used in business. The ability to read, comprehend, and manipulate numbers is an essential part of the everyday activity in today's complex business world. To be successful, business students should become competent and confident in dealing with numbers.

We will begin our study of business mathematics with whole numbers and their basic operations—addition, subtraction, multiplication, and division. The material in this chapter is based on the assumption that you have a basic working knowledge of these operations. Our goal is to review these fundamentals and build accuracy and speed. This arithmetic review will set the groundwork for our study of fractions, decimals, and percentages. Most business math applications involve calculations using these components.

1-1 Reading and Writing Whole Numbers in Numerical and Word Form

decimal number system A system using the 10 Hindu-Arabic symbols 0 through 9. In this place value system, the position of a digit to the left or right of the decimal point affects its value.

decimal point A dot written in a decimal number that separates the whole number part from the fractional part of the number.

whole numbers Any numbers 0 or greater that do not contain a decimal or fraction. Whole numbers are found to the left of the decimal point. Also known as an integer. For example, 6, 25, and 300 are whole numbers.

The number system most widely used in the world today is known as the Hindu-Arabic numeral system, or **decimal number system**. This system is far superior to any other for today's complex business calculations. It derives its name from the Latin words *decimus*, meaning 10th, and *decem*, meaning 10. The decimal system is based on 10s, with the starting point marked by a dot known as the **decimal point**. The decimal system uses the 10 familiar Hindu-Arabic symbols or digits:

0, 1, 2, 3, 4, 5, 6, 7, 8, 9

The major advantage of our decimal system over previous systems is that the position of a digit to the left or right of the decimal point affects its value. This enables us to write any number with only the 10 single-digit numbers, 0 through 9. For this reason, we have given names to the places or positions. In this chapter, we work with places to the left of the decimal point, **whole numbers**. The next two chapters are concerned with the places to the right of the decimal point, fractions, and decimals.

When whole numbers are written, a decimal point is understood to be located on the right of the number. For example, the number **27** is actually

27.

The decimal point is not displayed until we write a decimal number or dollars and cents, such as 27.25 inches or $27.25.

© Pressmaster/Shutterstock.com

Skills you acquire in this course will be applied frequently in your roles as a consumer and a businessperson.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Exhibit 1-1 illustrates the first 15 places, and five groups, of the decimal number system. Note that our system is made up of groups of three places, separated by commas, each with its own name. Whole numbers start at the understood decimal point and increase in value from right to left. Each group contains the same three places: ones, tens, and hundreds. Note that each place increases by a factor of "times 10." The group names are units, thousands, millions, billions, and trillions.

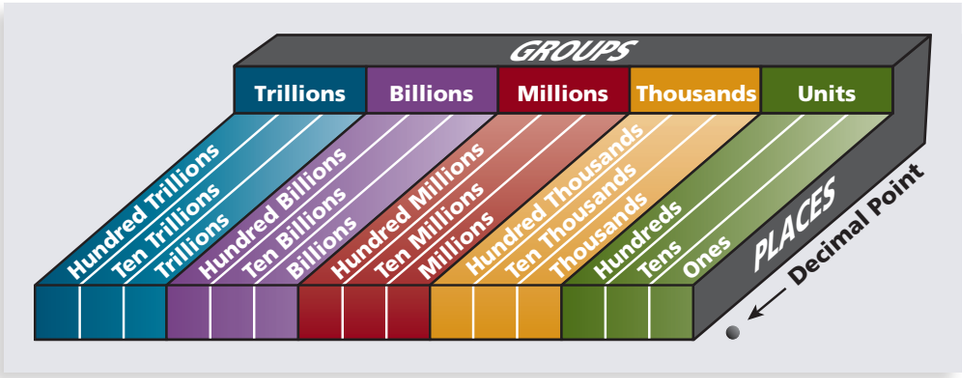


EXHIBIT 1-1
Whole Number Place Value Chart

STEPS FOR READING AND WRITING WHOLE NUMBERS

STEP 1. Beginning at the right side of the number, insert a comma after every three digits to mark the groups.

STEP 2. Beginning from left to right, name the digits and the groups. The units group and groups that have all zeros are not named.

STEP 3. When writing whole numbers in word form, the numbers from 21 to 99 are hyphenated, except for the decades (e.g., thirty). For example, 83 would be written as eighty-three.

Note: The word *and* should *not* be used in reading or writing whole numbers. It represents the decimal point and will be covered in Chapter 3.

Learning Tip

Whole numbers with four digits may be written with or without a comma. For example, 3,400 or 3400 are both correct.

EXAMPLE 1 READING AND WRITING WHOLE NUMBERS

Read and write the following whole numbers in numerical and word form.

a. 14296 b. 560
c. 2294857 d. 184910
e. 3004959001 f. 24000064

SOLUTION STRATEGY

Following the steps above, we insert the commas to mark the groups, then read and write the numbers from left to right.

	Number	Numerical Form	Word Form
a.	14296	14,296	fourteen thousand, two hundred ninety-six
b.	560	560	five hundred sixty
c.	2294857	2,294,857	two million, two hundred ninety-four thousand, eight hundred fifty-seven
d.	184910	184,910	one hundred eighty-four thousand, nine hundred ten
e.	3004959001	3,004,959,001	three billion, four million, nine hundred fifty-nine thousand, one
f.	24000064	24,000,064	twenty-four million, sixty-four

IN THE Business World

In text, large numbers, in the millions and greater, may be easier to read by writing the "zeros portion" in words. For example, 44,000,000,000,000 may be written as 44 trillion.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

TRY IT EXERCISE 1

Read and write the following whole numbers in numerical and word form.

a. 49588 b. 804 c. 1928837

d. 900015 e. 6847365911 f. 2000300007

CHECK YOUR ANSWERS WITH THE SOLUTIONS ON PAGE 24.

1-2 Rounding Whole Numbers to a Specified Place Value

rounded numbers Numbers that are approximations or estimates of exact numbers. For example, 50 is the rounded number of the exact number 49.

estimate To calculate approximately the amount or value of something. The number 50 is an estimate of 49.

rounding all the way A process of rounding numbers to the first (i.e., the leftmost) digit. Used to prework a problem to an estimated answer. For example, 2,865 rounded all the way is 3,000.

In many business applications, the use of an approximation of an exact number may be more desirable than using the number itself. Approximations, or **rounded numbers**, are easier to refer to and remember. For example, if a grocery store carries 9,858 items on its shelves, you would probably say that it carries 10,000 items. If you drive 1,593 miles, you would say that the trip is 1,600 miles. Another rounding application in business involves money. If your company has profits of $1,302,201, you might refer to this exact amount by the rounded number $1,300,000. Money amounts are usually rounded to the nearest cent, although they could also be rounded to the nearest dollar.

Rounded numbers are frequently used to **estimate** an answer to a problem before that problem is worked. Estimation approximates the exact answer. By knowing an estimate of an answer in advance, you will be able to catch many math errors. When using estimation to prework a problem, you can generally round off to the first (i.e., the leftmost) digit, which is called **rounding all the way**.

Once you have rounded to the first digit, perform the indicated math procedure. This can often be done quickly and will give you a ballpark or general idea of the actual answer. In the example below, the estimated answer of 26,000 is a good indicator of the "reasonableness" of the actual answer.

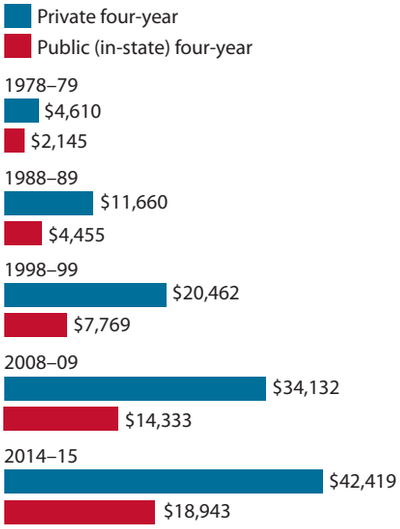
Original Calculation	Estimated Solution (rounding all the way)	Actual Solution
19,549	20,000	19,549
+ 6,489	+ 6,000	+ 6,489
	26,000	26,038

If, for example, you had mistakenly added for a total of 23,038 instead of 26,038, your estimate would have immediately indicated that something was wrong.

Dollars AND Sense

Pricey Diplomas

In the past three decades, college costs[1] have increased more than sevenfold at private schools and sixfold at public ones.



1. Figures include tuition, fees, and room and board and are not adjusted for inflation.

Source: *The College Board*

STEPS FOR ROUNDING WHOLE NUMBERS TO A SPECIFIED PLACE VALUE

STEP 1. Determine the place to which the number is to be rounded.

STEP 2a. If the digit to the right of the place being rounded is 5 or more, increase the digit in that place by 1.

STEP 2b. If the digit to the right of the place being rounded is 4 or less, do not change the digit in the place being rounded.

STEP 3. Change all digits to the right of the place being rounded to zeros.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

EXAMPLE 2 ROUNDING WHOLE NUMBERS

Round the following numbers to the indicated place.

a. 1,867 to tens
b. 760 to hundreds
c. 129,338 to thousands
d. 293,847 to hundred thousands
e. 97,078,838,576 to billions
f. 85,600,061 all the way

SOLUTION STRATEGY

Following the steps on page 4, locate the place to be rounded, use the digit to the right of that place to determine whether to round up or leave it as is, and change all digits to the right of the place being rounded to zeros.

		Place Indicated	Rounded Number
a.	1,867 to tens	1,867	1,870
b.	760 to hundreds	760	800
c.	129,338 to thousands	129,338	129,000
d.	293,847 to hundred thousands	293,847	300,000
e.	97,078,838,576 to billions	97,078,838,576	97,000,000,000
f.	85,600,061 all the way	85,600,061	90,000,000

TRY IT EXERCISE 2

Round the following numbers to the indicated place.

a. 51,667 to hundreds
b. 23,441 to tens
c. 175,445,980 to ten thousands
d. 59,561 all the way
e. 14,657,000,138 to billions
f. 8,009,070,436 to ten millions

CHECK YOUR ANSWERS WITH THE SOLUTIONS ON PAGE 24.

REVIEW EXERCISES 1 SECTION I

Read and write the following whole numbers in numerical and word form.

	Number	Numerical Form	Word Form
1.	22938	22,938	Twenty-two thousand, nine hundred thirty-eight
2.	1573		
3.	184		
4.	984773		
5.	2433590		
6.	49081472		

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Write the following whole numbers in numerical form.

7. One hundred eighty-three thousand, six hundred twenty-two 183,622
8. Seven million, sixty-one thousand, ten _____
9. According to Globo's G1 website, expenses in preparation for the 2014 World Cup in Brazil reached forty billion dollars. Write this number in numerical form. _____

Match the following numbers in word form with the numbers in numerical form.

10. One hundred two thousand, four hundred seventy __b__
11. One hundred twelve thousand, seven hundred forty-three _____
12. Twelve thousand, seven hundred forty-three _____
13. Eleven thousand, two hundred seventy _____
14. According to NCR Corporation, retailers in America generate 228,700,000 pounds of paper receipts per year. Write this number in word form.

a. 12,743
b. 102,470
c. 11,270
d. 112,743

Round the following numbers to the indicated place.

15. 1,757 to tens 1,760
16. 32,475 to thousands _____
17. 812,461 to hundreds _____
18. 559,443 to ten thousands _____
19. 25,812,922 to millions _____
20. 45,699 all the way _____
21. 1,325,669,226 to hundred millions _____
22. 23,755 all the way _____
23. According to the American Wind Energy Association, Texas has the highest operating wind capacity, 8,797 megawatts. Iowa is second with 3,053 megawatts capacity.
    a. Write each of these numbers in word form.

    b. Round each of these numbers to the nearest hundred.

24. According to the *Financial Times*, in a recent recession, outstanding consumer credit in the United States fell to $2,460,000,000,000—the seventh straight monthly decline. Most of the drop came as a result of consumers paying down revolving debt such as credit cards.
    a. Write this number in word form.

    b. Round this number to the nearest hundred billion.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

BUSINESS DECISION: UP OR DOWN?

25. You are responsible for writing a monthly stockholders' report about your company. Your boss has given you the flexibility to round the numbers to tens, hundreds, thousands, and so on, or not at all, depending on which is most beneficial for the company's image. For each of the following monthly figures, make a rounding choice and explain your reasoning.
    a. 74,469—number of items manufactured _____
    b. $244,833—your department's net sales for the month _____
    c. 5,648—defective items manufactured _____
    d. $649,341—total company profit _____
    e. 149 new customers _____

ADDITION AND SUBTRACTION OF WHOLE NUMBERS

1 SECTION II

Addition and subtraction are the most basic mathematical operations. They are used in almost all business calculations. In business, amounts of things or dollars are often combined or added to determine the total. Likewise, subtraction is frequently used to determine an amount of something after it has been reduced in quantity.

ADDING WHOLE NUMBERS AND VERIFYING YOUR ANSWERS

1-3

Addition is the mathematical process of computing sets of numbers to find their sum, or total. The numbers being added are known as **addends**, and the result or answer of the addition is known as the **sum**, **total**, or **amount**. The "+" symbol represents addition and is called the **plus sign**.

addition The mathematical process of computing sets of numbers to find their sum, or total.

addends Any of a set of numbers being added in an addition problem. For example, 4 and 1 are the addends of the addition problem 4 + 1 = 5.

sum, total, or amount The result or answer of an addition problem. The number 5 is the sum, or total, of 4 + 1 = 5.

plus sign The symbol "+" representing addition.

$$\begin{array}{rl} 1{,}932 & \text{addend} \\ 2{,}928 & \text{addend} \\ +\ 6{,}857 & \text{addend} \\ \hline 11{,}717 & \text{total} \end{array}$$

STEPS FOR ADDING WHOLE NUMBERS

STEP 1. Write the whole numbers in columns so that you line up the place values—units, tens, hundreds, thousands, and so on.

STEP 2. Add the digits in each column, starting on the right with the units column.

STEP 3. When the total in a column is greater than nine, write the units digit and carry the tens digit to the top of the next column to the left.

VERIFYING ADDITION

Generally, when adding the digits in each column, we add from top to bottom. An easy and commonly used method of verifying your addition is to add the numbers again, but this time from bottom to top. By adding the digits in the *reverse* order, you will reduce the chance of making the same error twice.

For illustrative purposes, addition verification will be rewritten in reverse. In actuality, you do not have to rewrite the numbers; just add them from bottom to top. As mentioned earlier, you will achieve speed and accuracy with practice.

Learning Tip

Once you become proficient at verifying addition, you can speed up your addition by recognizing and combining two numbers that add up to 10, such as 1 + 9, 2 + 8, 6 + 4, and 5 + 5. After you have mastered combining two numbers, try combining three numbers that add up to 10, such as 3 + 3 + 4, 2 + 5 + 3, and 4 + 4 + 2.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Addition	Verification
8	6
3	3
+ 6	+ 8
17	17

A WORD ABOUT WORD PROBLEMS

In business math, calculations are only a part of the story! Most importantly, business math requires the ability to (1) understand and analyze the facts of business situations, (2) determine what information is given and what is missing, (3) decide what strategy and procedure is required to solve for an answer, and (4) verify your answer. Business application word problems are an important part of each chapter's subject matter. As you progress through the course, your ability to analyze and solve these business situations will improve. Now start slowly and relax!

EXAMPLE 3 ADDING WHOLE NUMBERS

Add the following sets of whole numbers. Verify your answers by adding in reverse.

a.
$$\begin{array}{r} 40{,}562 \\ 29{,}381 \\ +\ 60{,}095 \end{array}$$

b. 2,293 + 121 + 7,706 + 20 + 57,293 + 4

c. Galaxy Industries, a furniture manufacturing company, has 229 employees in the design and cutting department, 439 employees in the assembly department, and 360 employees in the finishing department. There are 57 warehouse workers, 23 salespeople, 4 bookkeepers, 12 secretaries, and 5 executives. How many people work for this company?

SOLUTION STRATEGY

a.

$$\begin{array}{r} 40{,}562 \\ 29{,}381 \\ +\ 60{,}095 \\ \hline 130{,}038 \end{array}$$

Verification:

$$\begin{array}{r} 60{,}095 \\ 29{,}381 \\ +\ 40{,}562 \\ \hline 130{,}038 \end{array}$$

Step 1. Write the numbers in columns so that the place values line up. In this example, they are already lined up.

Step 2. Add the digits in each column, starting with the units column.

Units column: 2 + 1 + 5 = 8 Enter the 8 under the units column.

Tens column: 6 + 8 + 9 = 23 Enter the 3 under the tens column and carry the 2 to the hundreds column.

Hundreds column: 2 + 5 + 3 + 0 = 10 Enter the 0 under the hundreds column and carry the 1 to the thousands column.

Thousands column: 1 + 0 + 9 + 0 = 10 Enter the 0 under the thousands column and carry the 1 to the ten thousands column.

Ten thousands column: 1 + 4 + 2 + 6 = 13 Enter the 3 under the ten thousands column and the 1 under the hundred thousands column.

b.

Addition	Verification
2,293	4
121	57,293
7,706	20
20	7,706
57,293	121
+ 4	+ 2,293
67,437	67,437

c.

Addition	Verification
229	5
439	12
360	4
57	23
23	57
4	360
12	439
+ 5	+ 229
1,129	1,129

IN THE Business World

Basic math proficiency without calculators is important. Calculators are not permitted on most employment tests and Civil Service exams.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

TRY IT EXERCISE 3

Add the following sets of whole numbers and verify your answers.

a.
$$\begin{array}{r} 39{,}481 \\ 5{,}594 \\ +\ 11{,}029 \\ \hline \end{array}$$

b. 6,948 + 330 + 7,946 + 89 + 5,583,991 + 7 + 18,606

c. Anthony's Italian Restaurant served 183 meals on Monday, 228 meals on Tuesday, 281 meals on Wednesday, 545 meals on Thursday, and 438 meals on Friday. On the weekend, it served 1,157 meals. How many total meals were served that week?

CHECK YOUR ANSWERS WITH THE SOLUTIONS ON PAGE 24.

SUBTRACTING WHOLE NUMBERS AND VERIFYING YOUR ANSWERS

1-4

Subtraction is the mathematical computation of taking away, or deducting, an amount from a given number. Subtraction is the opposite of addition. The original or top number is the **minuend**; the amount we are subtracting from the original number is the **subtrahend**; and the answer is the **difference** (sometimes called the "remainder" although "difference" is preferred). The "−" symbol represents subtraction and is called the **minus sign**.

$$\begin{array}{rl} 2{,}495 & \text{minuend} \\ -\ \ 320 & \text{subtrahend} \\ \hline 2{,}175 & \text{difference} \end{array}$$

subtraction The mathematical process of taking away, or deducting, an amount from a given number.

minuend In subtraction, the original number. The amount from which another number, the subtrahend, is subtracted. For example, 5 is the minuend of the subtraction problem 5 − 1 = 4.

subtrahend The amount being taken or subtracted from the minuend. For example, 1 is the subtrahend of 5 − 1 = 4.

difference The number obtained when one number is subtracted from another. The answer or result of subtraction. For example, 4 is the difference of 5 − 1 = 4.

minus sign The symbol "−" representing subtraction.

STEPS FOR SUBTRACTING WHOLE NUMBERS

STEP 1. Write the whole numbers in columns so that the place values line up.

STEP 2. Starting with the units column, subtract the digits.

STEP 3. When a column cannot be subtracted, you must "borrow" a digit from the column to the left of the one you are working in.

VERIFYING SUBTRACTION

An easy and well-known method of verifying subtraction is to add the difference and the subtrahend. If you subtracted correctly, this total will equal the minuend.

Subtraction		Verification	
200	minuend	150	difference
− 50	subtrahend	+ 50	subtrahend
150	difference	200	minuend

EXAMPLE 4 SUBTRACTING WHOLE NUMBERS

Subtract the following whole numbers and verify your answers.

a.
$$\begin{array}{r} 4{,}968 \\ -\ 192 \\ \hline \end{array}$$

b. 189,440 − 1,347

c. On Monday morning, Appliance Depot had 165 microwave ovens in inventory. During the week, the store had a clearance sale and sold 71 of the ovens. How many ovens remain in stock for next week?

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Learning Tip

Because each place value increases by a factor of 10 as we move from right to left (units, tens, hundreds, etc.), when we borrow a digit, we can think of it as borrowing a 10.

SOLUTIONSTRATEGY

a.

$$\begin{array}{r} 4,\not{9}\not{6}8 \\ -\ \ 192 \\ \hline 4,776 \end{array}$$

Verification:

$$\begin{array}{r} 4,776 \\ +\ \ 192 \\ \hline 4,968 \end{array}$$

Write the numbers in columns so that the place values are lined up. In this problem, they are already lined up.
Starting with the units column, subtract the digits.
Units column: $8 - 2 = 6$. Enter the 6 under the units column.
Tens column: $6 - 9$ can't be subtracted, so we must borrow a digit, 10, from the hundreds column of the minuend. This reduces the 9 to an 8 and gives us a 10 to add to the 6, making it 16.
Now we can subtract 9 from 16 to get 7. Enter the 7 under the tens column.
Hundreds column: $8 - 1 = 7$. Enter the 7 under the hundreds column.
Thousands column: This column has no subtrahend, so just bring down the 4 from the minuend to the answer line.

b.

Subtraction	Verification
$\begin{array}{r} 189,\not{4}\not{4}0 \\ -\ \ 1,347 \\ \hline 188,093 \end{array}$	$\begin{array}{r} 188,093 \\ +\ \ 1,347 \\ \hline 189,440 \end{array}$

c.

Subtraction	Verification
$\begin{array}{r} \not{1}65 \\ -\ \ 71 \\ \hline 94 \end{array}$	$\begin{array}{r} 94 \\ +\ \ 71 \\ \hline 165 \end{array}$

TRYITEXERCISE 4

Subtract the following whole numbers and verify your answers.

a. $\begin{array}{r} 98,117 \\ -\ \ 7,682 \end{array}$

b. $12,395 - 5,589$

c. Joe Montgomery has $4,589 in his checking account. If he writes a check for $344, how much will be left in the account?

CHECK YOUR ANSWERS WITH THE SOLUTIONS ON PAGE 24.

SECTION II 1 REVIEW EXERCISES

Add the following numbers.

1. $\begin{array}{r} 45 \\ 27 \\ +\ 19 \\ \hline 91 \end{array}$

2. $\begin{array}{r} 548 \\ 229 \\ 4,600 \\ +\ 62,660 \end{array}$

3. $\begin{array}{r} 339 \\ 1,236 \\ 5,981 \\ 3,597 \\ +\ 8,790 \end{array}$

4. $\begin{array}{r} 2,359 \\ 8,511 \\ +\ 14,006 \end{array}$

5. $\begin{array}{r} 733 \\ 401 \\ 1,808 \\ 24,111 \\ +\ 10,595 \end{array}$

6. $2,339 + 118 + 3,650 + 8,770 + 81 + 6 =$ _____

7. $12,554 + 22,606 + 11,460 + 20,005 + 4,303 =$ _____

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Estimate the following by rounding each number all the way; then add to find the exact answer.

		Estimate	Rounded Estimate	Exact Answer
8.	288 512 3,950 + 1,944 6,694	300 500 4,000 + 2,000 6,800	6,800	6,694
9.	27,712 5,281 + 368		_____	_____
10.	318,459 + 283,405		_____	_____

11. City traffic engineers in Canmore are doing an intersection traffic survey. On Tuesday, a counter placed at the intersection of Armstrong Place and Three Sisters Blvd. registered the following counts: morning, 2,594; afternoon, 2,478; and evening, 1,863.
    a. Round each number to the nearest hundred and add to get an *estimate* of the traffic count for the day.

    b. What was the *exact* amount of traffic for the day?

12. While shopping, Tyler Hammond purchases items for $3, $24, $13, $2, and $175. How much did he spend?

13. The following chart shows the April, May, and June sales figures by service categories for Pandora's Beauty Salon. Total each row to get the category totals. Total each column to get the monthly totals. Calculate the grand total for the three-month period.

Pandora's Beauty Salon

Service Category	April	May	June		Category Totals
Cutting, Styling, Coloring	$13,515	$12,350	$14,920		_____
Manicure, Pedicure, Waxing	5,418	7,640	5,756		_____
Facials and Makeup	4,251	6,125	6,740		_____
Beauty Supplies	8,690	7,254	10,346		_____
Monthly Totals	_____	_____	_____	**Grand Total**	

© Yuri Shirokov/Shutterstock.com

Service Sector According to the *CIA World Factbook*, service sector businesses such as beauty salons and dry cleaners account for 79.6% of the U.S. economy's gross domestic product. Other sectors include industrial at 19.2% and agriculture at 1.2%.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

14. At Cherry Valley Farms, a farmer plants 350 acres of soybeans, 288 acres of corn, 590 acres of wheat, and 43 acres of assorted vegetables. In addition, the farm has 9 acres for grazing and 4 acres for the barnyard and farmhouse. What is the total acreage of the farm?

15. Service Masters Carpet Cleaners pays its sales staff a salary of $575 per month, plus commissions. Last month Alex Acosta earned commissions of $129, $216, $126, $353, and $228. What was Alex's total income for the month?

Subtract the following numbers.

16. $\begin{array}{r} 354 \\ -\ 48 \\ \hline 306 \end{array}$

17. $\begin{array}{r} 5{,}596 \\ -\ 967 \\ \hline \end{array}$

18. $\begin{array}{r} 95{,}490 \\ -\ 73{,}500 \\ \hline \end{array}$

19. $\begin{array}{r} 339{,}002 \\ -\ 60{,}911 \\ \hline \end{array}$

20. $\begin{array}{r} 2{,}000{,}077 \\ -\ 87{,}801 \\ \hline \end{array}$

21. $206 minus $58

22. 67,800 – 9,835

23. $127 less $33

24. Subtract 5,868 from 10,918

25. Subtract 8,906,000 from 12,396,700

26. The beginning inventory of the Designer Shoe Salon for August was 850 pairs of shoes. On the 9th, it received a shipment from the factory of 297 pairs. On the 23rd, another shipment of 188 pairs arrived. When inventory was taken at the end of the month, there were 754 pairs left. How many pairs of shoes were sold that month?

Dollars AND Sense

The American Association of Retired Persons offers financial advice targeted at those in their 20s and 30s at www.aarp.org/money. The site contains tips from financial experts as well as calculators to help you budget and determine ways to reduce debt.

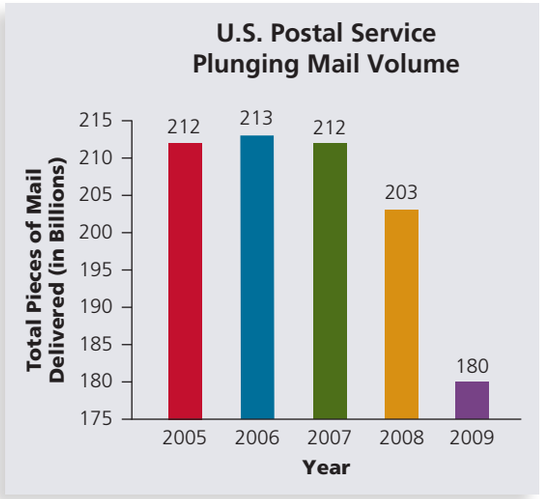
27. An electrician, Sparky Wilson, starts the day with 650 feet of wire on his truck. In the morning, he cuts off pieces 26, 78, 45, and 89 feet long. During lunch, he goes to an electrical supply warehouse and buys another 250 feet of wire. In the afternoon, he uses lengths of 75, 89, and 120 feet. How many feet of wire are still on the truck at the end of the day?

28. Use the U.S. Postal Service Mail Volume graph on the next page to answer the following questions.
    a. How many pieces were delivered in 2005 and 2006 combined?

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

b. How many fewer pieces were delivered in 2009 than in 2007?

c. Write the number of pieces of mail for 2008 in numerical form.



Rapidly Decreasing Postal Volume This chart illustrates the dramatic decrease in U.S. postal mail volume as e-mail and other electronic transfers of information became more widely used.
Source: *U.S. Postal Service*

29. Eileen Townsend is planting her flower beds. She initially bought 72 bedding plants at Home Depot.
    a. If she plants 29 in the front bed, how many plants remain unplanted?

    b. Eileen's remaining flower beds have room for 65 bedding plants. How many more plants must she buy to fill up the flower beds?

    c. How many total plants did she buy?

30. An Allied Vans Lines moving truck picks up loads of furniture weighing 5,500 pounds, 12,495 pounds, and 14,562 pounds. The truck weighs 11,480 pounds, and the driver weighs 188 pounds. If a bridge has a weight limit of 42,500 pounds, is the truck within the weight limit to cross the bridge?

BUSINESS DECISION: PERSONAL BALANCE SHEET

31. A *personal balance sheet* is the financial picture of how much "wealth" you have accumulated as of a certain date. It specifically lists your *assets* (i.e., what you own) and your *liabilities* (i.e., what you owe). Your current *net worth* is the difference between the assets and the liabilities.

Net worth = Assets – Liabilities

Tom and Carol Jackson have asked for your help in preparing a personal balance sheet. They have listed the following assets and liabilities: current value of home, $144,000; audio/video equipment, $1,340; automobiles, $17,500; personal property, $4,350; computer, $3,700; mutual funds, $26,700; 401(k) retirement plan, $53,680; jewelry, $4,800; certificates of deposit, $19,300; stock investments, $24,280; furniture and other household goods, $8,600; balance on Wal-Mart and Sears charge accounts, $4,868; automobile loan balance, $8,840; home mortgage balance, $106,770; Visa and MasterCard balances, $4,211; savings account balance, $3,700; Carol's night school tuition loan balance, $2,750; checking account balance, $1,385; signature loan balance, $6,350.

Use the data provided and the personal balance sheet on page 14 to calculate the following for the Jacksons.

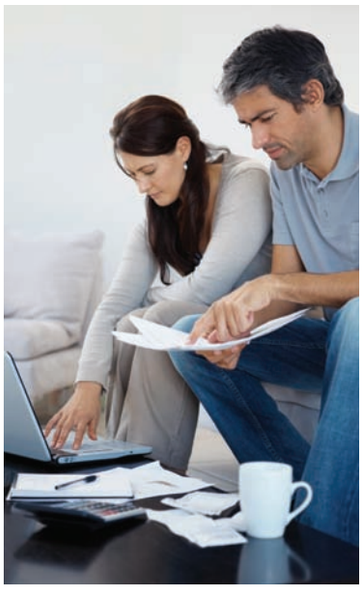
a. Total assets

b. Total liabilities

c. Net worth

d. Explain the importance of the personal balance sheet. How often should this information be updated?

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.



© Yuri Shirokov/Shutterstock.com

Just as with corporate statements, **personal financial statements** are an important indicator of your financial position. The balance sheet, income statement, and cash flow statement are most commonly used. When compared over a period of time, they tell a story of where you have been and where you are going financially.

PERSONAL BALANCE SHEET

ASSETS		LIABILITIES	
CURRENT ASSETS		**CURRENT LIABILITIES**	
Checking account	_____	Store charge accounts	_____
Savings account	_____	Credit card accounts	_____
Certificates of deposit	_____	Other current debt	_____
Other	_____	**Total Current Liabilities**	_____
Total Current Assets	_____	**LONG-TERM LIABILITIES**	
LONG-TERM ASSETS		Home mortgage	_____
Investments		Automobile loan	_____
Retirement plans	_____	Education loan	_____
Stocks	_____	Other loan	_____
Bonds	_____	Other loan	_____
Mutual funds	_____	**Total Long-Term Liabilities**	_____
Other	_____	**TOTAL LIABILITIES**	_____
Personal			
Home	_____		
Automobiles	_____		
Furniture	_____		
Personal property	_____		
Jewelry	_____		
Other	_____	**NET WORTH**	
Other	_____	**Total Assets**	_____
Total Long-Term Assets	_____	**Total Liabilities**	_____
TOTAL ASSETS	_____	**NET WORTH**	_____

SECTION III 1 Multiplication and Division of Whole Numbers

Multiplication and division are the next two mathematical procedures used with whole numbers. Both are found in business as often as addition and subtraction. In reality, most business problems involve a combination of procedures. For example, invoices, which are a detailed list of goods and services sold by a company, require multiplication of items by the price per item and then addition to reach a total. From the total, discounts are frequently subtracted or transportation charges are added.

1-5 Multiplying Whole Numbers and Verifying Your Answers

multiplication The combination of two numbers in which the number of times one is represented is determined by the value of the other.

multiplicand In multiplication, the number being multiplied. For example, 5 is the multiplicand of $5 \times 4 = 20$.

Multiplication of whole numbers is actually a shortcut method for addition. Let's see how this works. If a clothing store buys 12 pairs of jeans at \$29 per pair, what is the total cost of the jeans? One way to solve this problem is to add \$29 + \$29 + . . . , 12 times. It's not hard to see how tedious this repeated addition becomes, especially with large numbers. By using multiplication, we get the answer in one step: $12 \times 29 = \$348$.

Multiplication is the combination of two whole numbers in which the number of times one is represented is determined by the value of the other. These two whole numbers are known as factors. The number being multiplied is the **multiplicand**, and the number by which

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

the multiplicand is multiplied is the **multiplier**. The answer to a multiplication problem is the **product**. Intermediate answers are called partial products.

multiplier The number by which the multiplicand is multiplied. For example, 4 is the multiplier of $5 \times 4 = 20$.

product The answer or result of multiplication. The number 20 is the product of $5 \times 4 = 20$.

	258	multiplicand or factor
×	43	multiplier or factor
	774	partial product 1
10	32	partial product 2
	11,094	product

In mathematics, the **times sign**—represented by the symbols "×" or "·" or "( )"—is used to indicate multiplication. For example, 12 times 18 can be expressed as

times sign The symbol "×" representing multiplication. Also represented by a raised dot "·" or parentheses "( )".

$$12 \times 18 \quad 12 \cdot 18 \quad (12)(18) \quad 12(18)$$

Note: The raised symbol · is *not* a decimal point.

STEPS FOR MULTIPLYING WHOLE NUMBERS

STEP 1. Write the factors in columns so that the place values line up.

STEP 2. Multiply each digit of the multiplier, starting with units, times the multiplicand. Each will yield a partial product whose units digit appears under the corresponding digit of the multiplier.

STEP 3. Add the digits in each column of the partial products, starting on the right with the units column.

MULTIPLICATION SHORTCUTS

The following shortcuts can be used to make multiplication easier and faster.

1. **When multiplying any number times 0**, the resulting product is *always* 0. For example,

$$573 \times 0 = 0 \quad 0 \times 34 = 0 \quad 1{,}254{,}779 \times 0 = 0$$

2. **When multiplying a number times 1, the product is that number itself.** For example,

$$1{,}844 \times 1 = 1{,}844 \quad 500 \times 1 = 500 \quad 1 \times 894 = 894$$

3. **When a number is multiplied by 10, 100, 1,000, 10,000, 100,000, and so on,** simply attach the zeros of the multiplier to the end of that number. For example,

$$792 \times 100 = 79{,}200 \quad 9{,}345 \times 1{,}000 = 9{,}345{,}000$$

4. **When the multiplier has a 0 in one or more of its middle digits,** there is no need to write a whole line of zeros as a partial product. Simply place a 0 in the next partial product row directly below the 0 in the multiplier and go on to the next digit in the multiplier. The next partial product will start on the same row one place to the left of the 0 and directly below its corresponding digit in the multiplier. For example, consider 554 times 103.

Shortcut:		*Long way:*	
	554		554
	× 103		× 103
	1 662		1 662
55	40		0 00
	57,062	55	4
			57,062

5. **When the multiplicand and/or the multiplier have zeros at the end,** multiply the two numbers without the zeros and attach that number of zeros to the product. For example,

$$130 \times 90 = 11{,}700$$

Note: $13 \times 9 = 117$, and we attach two zeros (and include a comma).

$$5{,}800 \times 3{,}400 = 19{,}720{,}000$$

Note: $58 \times 34 = 1{,}972$, and we attach four zeros (and adjust the commas).

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

VERIFYING MULTIPLICATION

To check your multiplication for accuracy, divide the product by the multiplier. If the multiplication was correct, this will yield the multiplicand. For example,

Multiplication	Verification	Multiplication	Verification
$\begin{array}{r} 48 \\ \times\ 7 \\ \hline 336 \end{array}$	$336 \div 7 = 48$	$\begin{array}{r} 527 \\ \times\ 18 \\ \hline 4\,216 \\ 5\,27 \\ \hline 9{,}486 \end{array}$	$9{,}486 \div 18 = 527$

Learning Tip

In multiplication, the factors are interchangeable. For example, 15 times 5 gives the same product as 5 times 15.

Multiplication is usually expressed with the larger factor on top as the multiplicand and the smaller factor placed under it as the multiplier.

EXAMPLE 5 MULTIPLYING WHOLE NUMBERS

Multiply the following numbers and verify your answers by division.

a. $\begin{array}{r} 2{,}293 \\ \times\ 45 \\ \hline \end{array}$ b. $\begin{array}{r} 59{,}300 \\ \times\ 180 \\ \hline \end{array}$ c. $436 \times 2{,}027$ d. 877×1 e. $6{,}922 \times 0$

f. Maytag Industries has a new aluminum parts molding machine that produces 85 parts per minute. How many parts can this machine produce in an hour? If a company has 15 of these machines and they run for 8 hours per day, what is the total output of parts per day?

SOLUTION STRATEGY

a.
$$\begin{array}{r} 2{,}293 \\ \times\ 45 \\ \hline 11\,465 \\ 91\,72 \\ \hline 103{,}185 \end{array}$$

This is a standard multiplication problem with two partial products. Always be sure to keep your columns lined up. The answer, 103,185, can be verified by division: $103{,}185 \div 45 = 2{,}293$

b.
$$\begin{array}{r} 593 \\ \times\ 18 \\ \hline 4\,744 \\ 5\,93 \\ \hline \end{array}$$

$10{,}674 + \text{“000”} = 10{,}674{,}000$

In this problem, we remove the three zeros, multiply, and then add back the zeros.
Verification: $10{,}674 \div 18 = 593$

c.
$$\begin{array}{r} 2{,}027 \\ \times\ 436 \\ \hline 12\,162 \\ 60\,81 \\ 810\,8 \\ \hline 883{,}772 \end{array}$$

This is another standard multiplication problem. Note that the larger number was made the multiplicand (top) and the smaller number became the multiplier. This makes the problem easier to work.
Verification: $883{,}772 \div 436 = 2{,}027$

d. $877 \times 1 = 877$ Remember, any number multiplied by 1 is that number.

e. $6{,}922 \times 0 = 0$ Remember, any number multiplied by 0 is 0.

f. 85 parts per minute × 60 minutes per hour = 5,100 parts per hour
5,100 parts per hour × 15 machines = 76,500 parts per hour, all machines
76,500 parts per hour × 8 hours per day = 612,000 parts per day, total output

TRY IT EXERCISE 5

Multiply the following numbers and verify your answers.

a. $\begin{array}{r} 8{,}203 \\ \times\ 508 \\ \hline \end{array}$ b. $\begin{array}{r} 5{,}400 \\ \times\ 250 \\ \hline \end{array}$ c. $\begin{array}{r} 3{,}370 \\ \times 4{,}002 \\ \hline \end{array}$ d. 189×169

e. Howard Martin, a plasterer, can finish 150 square feet of interior wall per hour. If he works 6 hours per day
- How many square feet can he finish per day?
- If a contractor hires four plasterers, how many feet can they finish in a 5-day week?

CHECK YOUR ANSWERS WITH THE SOLUTIONS ON PAGE 25.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Dividing Whole Numbers and Verifying Your Answers

1-6

Just as multiplication is a shortcut for repeated addition, division is a shortcut for repeated subtraction. Let's say while shopping you want to know how many $5 items you can purchase with $45. You could get the answer by finding out how many times 5 can be subtracted from 45. You would begin by subtracting 5 from 45 to get 40, then subtracting 5 from 40 to get 35, subtracting 5 from 35 to get 30, and so on, until you get 0. Quite tedious, but it does give you the answer, 9. By using division, we simply ask how many $5 are contained in $45. By dividing 45 by 5, we get the answer in one step ($45 \div 5 = 9$). Because division is the opposite of multiplication, we can verify our answer by multiplying 5 times 9 to get 45.

Division of whole numbers is the process of determining how many times one number is contained within another number. The number being divided is called the **dividend**, the number doing the dividing is called the **divisor**, and the answer is known as the **quotient**. When the divisor has only one digit, as in 100 divided by 5, it is called short division. When the divisor has more than one digit, as in 100 divided by 10, it is known as long division.

The "÷" symbol represents division and is known as the **division sign**. For example, $12 \div 4$ is read "12 divided by 4." Another way to show division is

$$\frac{12}{4}$$

This is also read as "12 divided by 4." To actually solve the division, we use the sign $\overline{)}$. The problem is then written as $4\overline{)12}$. As in addition, subtraction, and multiplication, proper alignment of the digits is very important.

$$\frac{\text{Dividend}}{\text{Divisor}} = \text{Quotient} \qquad \begin{array}{r}\text{Quotient}\\ \text{Divisor}\,\overline{)\,\text{Dividend}}\end{array}$$

When the divisor divides evenly into the dividend, it is known as even division. When the divisor does not divide evenly into the dividend, the answer then becomes a quotient plus a **remainder**. The remainder is the amount left over after the division is completed. This is known as uneven division. In this chapter, a remainder of 3, for example, is expressed as R 3. In Chapter 2, remainders will be expressed as fractions, and in Chapter 3, remainders will be expressed as decimals.

division The mathematical process of determining how many times one number is contained within another number.

dividend In division, the quantity being divided. For example, 20 is the dividend of $20 \div 5 = 4$.

divisor The quantity by which another quantity, the dividend, is being divided. The number doing the dividing. For example, 5 is the divisor of $20 \div 5 = 4$.

quotient The answer or result of division. The number 4 is the quotient of $20 \div 5 = 4$.

division sign The symbol "÷" representing division.

remainder In uneven division, the amount left over after the division is completed. For example, 2 is the remainder of $22 \div 5 = 4$, R 2.

VERIFYING DIVISION

To verify even division, multiply the quotient by the divisor. If the problem was worked correctly, this will yield the dividend. To verify uneven division, multiply the quotient by the divisor and add the remainder to the product. If the problem was worked correctly, this will yield the dividend.

EVEN DIVISION ILLUSTRATED

$$\frac{850\ (\text{dividend})}{25\ (\text{divisor})} = 34\ (\text{quotient})$$

$$\begin{array}{r} 34 \\ 25\overline{)850} \\ \underline{75} \\ 100 \\ \underline{100} \\ 0 \end{array}$$

Verification: $34 \times 25 = 850$

UNEVEN DIVISION ILLUSTRATED

$$\frac{850\ (\text{dividend})}{20\ (\text{divisor})} = 42\ \text{R}\ 10\ (\text{quotient})$$

$$\begin{array}{r} 42\ \text{R}\ 10 \\ 20\overline{)850} \\ \underline{80} \\ 50 \\ \underline{40} \\ 10 \end{array}$$

Verification: $42 \times 20 = 840$, $+\ 10$, 850

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

STEPS FOR DIVIDING WHOLE NUMBERS

STEP 1. Determine the first group of digits in the dividend that the divisor will divide into at least once. Divide and place the partial quotient over the last digit in that group.

STEP 2. Multiply the partial quotient by the divisor. Place it under the first group of digits and subtract.

STEP 3. From the dividend, bring down the next digit after the first group of digits.

STEP 4. Repeat Steps 1, 2, and 3 until all of the digits in the dividend have been brought down.

EXAMPLE 6 DIVIDING WHOLE NUMBERS

Divide the following numbers and verify your answers.

a. $210 \div 7$ b. $185 \div 9$ c. $\frac{1,508}{6}$ d. $\frac{14,000}{3,500}$

e. On an assembly line, a packing machine uses rolls of rope containing 650 feet. How many 8-foot pieces can be cut from each roll?

SOLUTION STRATEGY

a.
$$\begin{array}{r} 30 \\ 7\overline{)210} \\ \underline{21} \\ 00 \end{array}$$

This is an example of even division. Note that there is no remainder.

Verification: $30 \times 7 = 210$

b.
$$\begin{array}{r} 20 \text{ R } 5 \\ 9\overline{)185} \\ \underline{18} \\ 5 \end{array}$$

This example illustrates uneven division. Note that there is a remainder.

Verification: $20 \times 9 = 180$

$$\begin{array}{r} +\ 5 \\ \hline 185 \end{array}$$

c.
$$\begin{array}{r} 251 \text{ R } 2 \\ 6\overline{)1508} \\ \underline{12} \\ 30 \\ \underline{30} \\ 08 \\ \underline{6} \\ 2 \end{array}$$

This is another example of uneven divison. Be sure to keep the digits properly lined up.

Verification: $251 \times 6 = 1,506$

$$\begin{array}{r} +\ 2 \\ \hline 1,508 \end{array}$$

d.
$$\begin{array}{r} 4 \\ 3500\overline{)14000} \\ \underline{14000} \\ 0 \end{array}$$

Here is another example of even division.

Verification: $4 \times 3,500 = 14,000$

e.
$$\begin{array}{r} 81 \text{ R } 2 \\ 8\overline{)650} \\ \underline{64} \\ 10 \\ \underline{8} \\ 2 \end{array}$$

In this word problem, we want to know how many 8-foot pieces of rope are contained in a 650-foot roll. The dividend is 650, and the divisor is 8. The quotient, 81 R 2, means that 81 whole pieces of rope can be cut from the roll with some left over, but not enough for another whole piece.

Verification: $81 \times 8 = 648$

$$\begin{array}{r} +\ 2 \\ \hline 650 \end{array}$$

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

TRY IT EXERCISE 6

Divide the following numbers and verify your answers.

a. $910 \div 35$ b. $1{,}503 \div 160$ c. $\frac{3{,}358}{196}$ d. $\frac{175}{12}$

e. Delta Industries has 39 production line workers, each making the same amount of money. If last week's total payroll amounted to $18,330, how much did each employee earn?

CHECK YOUR ANSWERS WITH THE SOLUTIONS ON PAGE 25.

REVIEW EXERCISES

1 SECTION III

Multiply the following numbers and verify your answers.

1. $589 \times 19 = 11{,}191$ 2. $1{,}292 \times 158$ 3. 327×900 4. $76{,}000 \times 45$ 5. $56{,}969 \times 1{,}000$

6. Multiply $6 by 1004. 7. 42×610 8. What is 475 times 12?

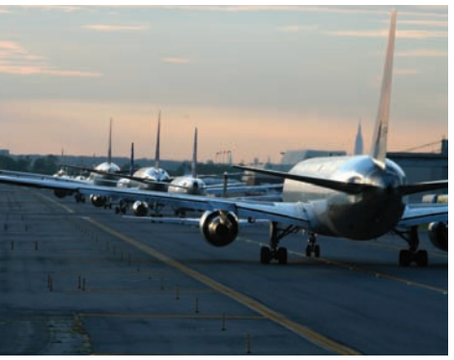
Estimate the following by rounding each number all the way; then multiply to get the exact answer.

		Estimate	Rounded Estimate	Exact Answer
9.	$202 \times 490 = 98{,}980$	$200 \times 500 = 100{,}000$	100,000	98,980
10.	515×180			
11.	17×11			

12. Dazzling Designs made custom drapery for a client using 30 yards of material.
    a. At $5 per yard, what is the cost of the material?

    b. If the company received 4 more orders of the same size, how much material will be needed to fill the orders?

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.


© Xavier Marchant/Shutterstock.com

13. The U.S. Department of Transportation has a rule designed to reduce passenger discomfort and inconvenience. It states that airlines must let passengers off domestic flights when they have waited three hours without taking off. Airlines that don't comply can be fined up to $27,500 per passenger.

    If a Premium Airlines 767 aircraft with 254 passengers on board was fined the maximum penalty for waiting four hours on the tarmac at JFK before takeoff last Tuesday, what was the amount of the fine?

14. There are 34 stairs from bottom to top in each of five stairways in the football bleachers at Waycross Stadium. If each track team member is to run four complete sets up and down each stairway, how many stairs will be covered in a workout?

EXCEL 2

15. To earn extra money while attending college, you work as a cashier in a restaurant.
    a. Find the total bill for the following food order: three sirloin steak dinners at $12 each; two baked chicken specials at $7 each; four steak burger platters at $5 each; two extra salads at $2 each; six drinks at $1 each; and tax of $7.

    b. How much change will you give back if the check is paid with a $100 bill?

16. Bob Powers, a consulting electrical engineer, is offered two different jobs. Abbott Industries has a project that pays $52 per hour and will take 35 hours to complete. Micro Systems has a project that pays $44 per hour and will take 45 hours to complete. Which offer has a greater gross income and by how much?

JUMP START WWW

Divide the following numbers.

17. $4{,}500 \div 35$

$$\begin{array}{r} 128 \text{ R } 20 \\ 35\overline{)4500} \\ \underline{35} \\ 100 \\ \underline{70} \\ 300 \\ \underline{280} \\ 20 \end{array}$$

18. $74{,}770 \div 5{,}700$

19. $\dfrac{6{,}000}{25}$

20. $\dfrac{2{,}365}{43}$

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Estimate the following by rounding each number to hundreds; then divide to get the exact answer.

	Estimate	Rounded Estimate	Exact Answer
21. 890 ÷ 295	$\frac{900}{300}$	3	3 R 5
22. 1,499 ÷ 580			
23. 68,246 ÷ 112			

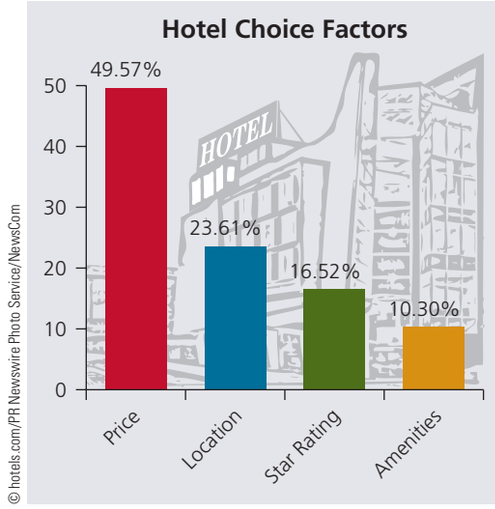
24. Tip-Top Roofing has 50,640 square feet of roofing material on hand. If the average roof requires 8,440 square feet of material, how many roofs can be installed?

25. A calculator uses eight circuit boards, each containing 450 parts. A company has 421,215 parts in stock.
    a. How many calculators can it manufacture?

    b. How many parts will be left over?

26. Eric Shotwell borrows $24,600 from the Mercantile Bank and Trust Co. The interest charge amounts to $8,664. What equal monthly payments must Eric make in order to pay back the loan, with interest, in 36 months?

27. A 16-person college basketball team is going to a tournament in Boston. As the team manager, you are trying to find the best price for hotel rooms. The Windsor Hotel is quoting a price of $108 for 2 people in a room and $10 for each extra person. The Royale Hotel is quoting a price of $94 for 2 people in a room and $15 for each extra person. If the maximum number of people allowed in a room is 4, which hotel would be more economical?



Hotels.com Survey When selecting a hotel, what do you consider most important?

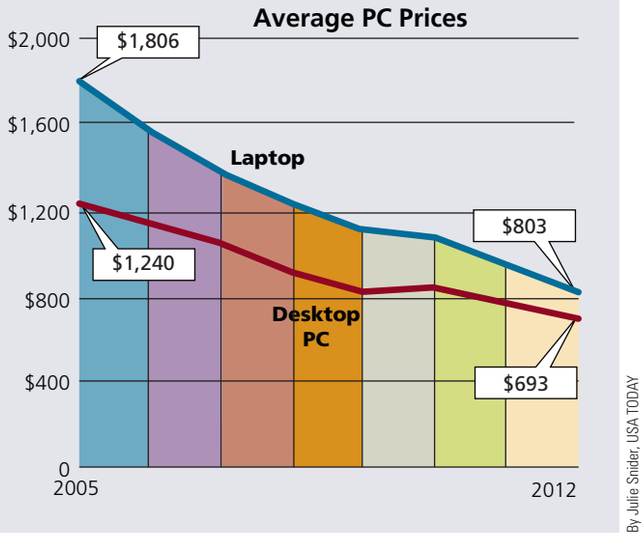
28. You have just purchased a 65-acre ranch for a price of $780 per acre. In addition, the house was valued at $125,000 and the equipment amounted to $22,300.
    a. What was the total price of your purchase?

    b. Since the owner was anxious to sell, he offered to finance the ranch for you with a no-interest mortgage loan. What would your monthly payments be to pay off the loan in 10 years?

    c. Besides the mortgage payment, you are required to make monthly property tax and insurance payments. If property tax is $3,000 per year and insurance is $2,400 per year, how much would these items add to your monthly expenses for the ranch?

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

29. As the IT manager for FastNet Enterprises, you have maintained records of the average prices you've paid for PCs over the years, and you are reviewing your records over a particularly interesting period in your company's history. In 2005, you purchased 12 laptop computers and 15 desktop computers for your office staff. Using the graph Average PC Prices, answer the following:



a. What was the total amount of the purchase for these computers in 2005?

b. In 2012, you replaced all of the computers with new ones. What was the total amount of the purchase for these computers?

c. In total, how much did you save in 2012 over 2005 because of falling computer prices?

BUSINESS DECISION: ESTIMATING A TILE JOB

30. You are the owner of Decorama Flooring. Todd and Claudia have asked you to give them an estimate for tiling four rooms of their house. The living room is 15 feet × 23 feet, the dining room is 12 feet × 18 feet, the kitchen is 9 feet × 11 feet, and the study is 10 feet × 12 feet.

a. How many square feet of tile are required for each room? (Multiply the length by the width.)

b. What is the total number of square feet to be tiled?

c. If the tile for the kitchen and study costs $4 per square foot and the tile for the living and dining rooms costs $3 per square foot, what is the total cost of the tile?

d. If your company charges $2 per square foot for installation, what is the total cost of the tile job?

e. If Todd and Claudia have saved $4,500 for the tile job, by how much are they over or under the amount needed?

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Chapter Summary

Section I: The Decimal Number System: Whole Numbers

Topic	Important Concepts	Illustrative Examples
Reading and Writing Whole Numbers in Numerical and Word Form **Performance Objective 1-1, Page 2**	1. Insert the commas every three digits to mark the groups, beginning at the right side of the number. 2. From left to right, name the digits and the units group. The units group and groups that have all zeros are not named. 3. When writing whole numbers in word form, the numbers from 21 to 99 are hyphenated, expect for the decades (e.g., thirty). *Note:* The word *and* should not be used in reading or writing whole numbers.	Write each number in numerical and word form. The number 15538 takes on the numerical form 15,538 and is read, "fifteen thousand, five hundred thirty-eight." The number 22939643 takes on the numerical form 22,939,643 and is read, "twenty-two million, nine hundred thirty-nine thousand, six hundred forty-three." The number 1000022 takes on the numerical value 1,000,022 and is read, "one million, twenty-two."
Rounding Whole Numbers to a Specified Place Value **Performance Objective 1-2, Page 4**	1. Determine the place to which the number is to be rounded. 2a. If the digit to the right of the one being rounded is 5 or more, increase the digit in the place being rounded by 1. 2b. If the digit to the right of the one being rounded is 4 or less, do not change the digit in the place being rounded. 3. Change all digits to the right of the place being rounded to zeros.	Round as indicated. 1,449 to tens = 1,450 255 to hundreds = 300 345,391 to thousands = 345,000 68,658,200 to millions = 69,000,000 768,892 all the way = 800,000

Section II: Addition and Subtraction of Whole Numbers

Topic	Important Concepts	Illustrative Examples
Adding Whole Numbers and Verifying Your Answers **Performance Objective 1-3, Page 7**	1. Write the whole numbers in columns so that the place values line up. 2. Add the digits in each column, starting on the right with the units column. 3. When the total in a column is greater than 9, write the units digit and carry the tens digit to the top of the next column to the left. To verify addition, add the numbers in reverse, from bottom to top.	Add 2 11 1,931 addend 2,928 addend + 5,857 addend 10,716 sum Verification: 2 11 5,857 2,928 + 1,931 10,716
Subtracting Whole Numbers and Verifying Your Answers **Performance Objective 1-4, Page 9**	1. Write the whole numbers in columns so that the place values line up. 2. Starting with the units column, subtract the digits. 3. When a column cannot be subtracted, borrow a digit from the column to the left of the one you are working in. To verify subtraction, add the difference and the subtrahend; this should equal the minuend.	Subtract 34,557 minuend − 6,224 subtrahend 28,333 difference Verification: 28,333 + 6,224 34,557

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Section III: Multiplication and Division of Whole Numbers

Topic	Important Concepts	Illustrative Examples
Multiplying Whole Numbers and Verifying Your Answers **Performance Objective 1-5, Page 14**	1. Write the multiplication factors in columns so that the place values are lined up. 2. Multiply each digit of the multiplier, starting with units, times the multiplicand. Each will yield a partial product whose units digit appears under the corresponding digit of the multiplier. 3. Add the digits in each column of the partial products, starting on the right, with the units column. To verify multiplication, divide the product by the multiplier. If the multiplication is correct, it should yield the multiplicand.	Multiply 258×43 258 multiplicand or factor $\times$ 43 multiplier or factor 774 partial product 1 10 32 partial product 2 11,094 product Verification: $\frac{11{,}094}{43} = 258$
Dividing Whole Numbers and Verifying Your Answers **Performance Objective 1-6, Page 17**	1. The number being divided is the dividend. The number by which we are dividing is the divisor. The answer is known as the quotient. Quotient Divisor)Dividend 2. If the divisor does not divide evenly into the dividend, the quotient will have a remainder. To verify division, multiply the divisor by the quotient and add the remainder. If the division is correct, it will yield the dividend.	Divide 650 by 27. $650 \div 27 = \frac{650}{27} =$ 24 R 2 27)650 54 110 108 2 Verification: $27 \times 24 = 648 + 2 = 650$

Try It: Exercise Solutions for Chapter 1

	Numerical Form	Word Form
1a.	49,588	Forty-nine thousand, five hundred eighty-eight
1b.	804	Eight hundred four
1c.	1,928,837	One million, nine hundred twenty-eight thousand, eight hundred thirty-seven
1d.	900,015	Nine hundred thousand, fifteen
1e.	6,847,365,911	Six billion, eight hundred forty-seven million, three hundred sixty-five thousand, nine hundred eleven
1f.	2,000,300,007	Two billion, three hundred thousand, seven

2a. 51,700 **2b.** 23,440 **2c.** 175,450,000 **2d.** 60,000 **2e.** 15,000,000,000 **2f.** 8,010,000,000

3a.
39,481 *Verify:* 11,029
5,594 5,594
+ 11,029 + 39,481
56,104 56,104

3b.
6,948 *Verify:* 18,606
330 7
7,946 5,583,991
89 89
5,583,991 7,946
7 330
+ 18,606 + 6,948
5,617,917 5,617,917

3c.
183 *Verify:* 1,157
228 438
281 545
545 281
438 228
+ 1,157 + 183
2,832 Meals 2,832 Meals

4a.
98,117 *Verify:* 90,435
− 7,682 + 7,682
90,435 98,117

4b.
12,395 *Verify:* 6,806
− 5,589 + 5,589
6,806 12,395

4c.
$4,589 *Verify:* $4,245
− 344 + 344
$4,245 Left in account $4,589

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

5a.
$$\begin{array}{r} 8{,}203 \\ \times\ 508 \\ \hline 65\,624 \\ 4\,101\,50 \\ \hline 4{,}167{,}124 \end{array}$$

Verify: $\frac{4{,}167{,}124}{508} = 8{,}203$

5b.
$$\begin{array}{r} 5{,}400 \\ \times\ 250 \\ \hline 270\,000 \\ 1\,080\,00 \\ \hline 1{,}350{,}000 \end{array}$$

Verify: $\frac{1{,}350{,}000}{250} = 5{,}400$

5c.
$$\begin{array}{r} 3{,}370 \\ \times\ 4{,}002 \\ \hline 6\,740 \\ 13\,480\,00 \\ \hline 13{,}486{,}740 \end{array}$$

Verify: $\frac{13{,}486{,}740}{4{,}002} = 3{,}370$

5d. 189×169

$$\begin{array}{r} 189 \\ \times\ 169 \\ \hline 1\,701 \\ 11\,34 \\ 18\,9 \\ \hline 31{,}941 \end{array}$$

Verify: $\frac{31{,}941}{169} = 189$

5e.
$$\begin{array}{r} 150 \\ \times\ 6 \\ \hline 900 \end{array}$$ sq ft per day

$$\begin{array}{r} 900 \\ \times\ 4 \\ \hline 3{,}600 \end{array}$$ sq ft per day — Plasterers

$$\begin{array}{r} 3{,}600 \\ \times\ 5 \\ \hline 18{,}000 \end{array}$$ sq ft in 5 days — Days

6a.
$$\begin{array}{r} 26 \\ 35\overline{)910} \\ 70 \\ \hline 210 \\ 210 \\ \hline 0 \end{array}$$

Verify: $26 \times 35 = 910$

6b.
$$\begin{array}{r} 9\text{ R }63 \\ 160\overline{)1{,}503} \\ 1\,440 \\ \hline 63 \end{array}$$

Verify:
$$\begin{array}{r} 160 \times 9 = 1{,}440 \\ +\ 63 \\ \hline 1{,}503 \end{array}$$

6c.
$$\begin{array}{r} 17\text{ R }26 \\ 196\overline{)3{,}358} \\ 1\,96 \\ \hline 1\,398 \\ 1\,372 \\ \hline 26 \end{array}$$

Verify:
$$\begin{array}{r} 196 \times 17 = 3{,}332 \\ +\ 26 \\ \hline 3{,}358 \end{array}$$

6d.
$$\begin{array}{r} 14\text{ R }7 \\ 12\overline{)175} \\ 12 \\ \hline 55 \\ 48 \\ \hline 7 \end{array}$$

Verify:
$$\begin{array}{r} 12 \times 14 = 168 \\ +\ 7 \\ \hline 175 \end{array}$$

6e. $\frac{18{,}330}{39} = \$470$ Per employee

$$\begin{array}{r} 470 \\ 39\overline{)18{,}330} \\ 15\,6 \\ \hline 2\,73 \\ 2\,73 \\ \hline 0 \end{array}$$

Verify: $39 \times 470 = 18{,}330$

CONCEPT REVIEW

1. The number system most widely used in the world today is known as the Hindu-Arabic numeral system, or _____ number system. (1-1)

2. Our number system utilizes the 10 Hindu-Arabic symbols _____ through _____ to write any number. (1-1)

3. The set of numbers 1, 2, 3, 4, . . . are known as _____ numbers. (1-1)

4. On the place value chart, whole numbers appear to the _____ of the decimal point. (1-1)

5. A(n) _____ number is an approximation or estimate of an exact number. (1-2)

6. Rounding all the way is a process of rounding numbers to the _____ digit. (1-2)

7. In addition, the numbers being added are known as _____; the answer is known as the _____. (1-3)

8. When performing addition, we write the addends in columns so that the place values are aligned _____. (1-3)

9. The mathematical process of taking away, or deducting, an amount from a given number is known as _____. (1-4)

10. In subtraction, when a column cannot be subtracted, we must _____ a digit from the column to the left. (1-4)

11. In multiplication, the product of any number and 0 is _____. (1-5)

12. In multiplication, the product of any number and _____ is the number itself. (1-5)

13. The amount left over after division is completed is known as the _____. (1-6)

14. Show four ways to express 15 divided by 5. (1-6)

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

CHAPTER 1

Assessment Test

Read and write the following whole numbers in numerical and word form.

	Number	Numerical Form	Word Form
1.	200049		
2.	52308411		

Write the following whole numbers in numerical form.

3. Three hundred sixteen thousand, two hundred twenty-nine

4. Four million, five hundred sixty thousand

Round the following numbers to the indicated place.

5. 18,334 to hundreds

6. 450,191 all the way

7. 256,733 to ten thousands

Perform the indicated operation for the following.

8.
$$\begin{array}{r} 1{,}860 \\ 2{,}391 \\ 133 \\ +\ 1{,}009 \end{array}$$

9.
$$\begin{array}{r} 927 \\ -\ 828 \end{array}$$

10.
$$\begin{array}{r} 207 \\ \times\ 106 \end{array}$$

11. $42\overline{)1876}$

12.
$$\begin{array}{r} 3{,}505 \\ \times\ 290 \end{array}$$

13.
$$\begin{array}{r} 6{,}800 \\ 919 \\ 201 \\ +\ 14{,}338 \end{array}$$

14. $150{,}000 \div 188$

15. $1{,}205 - 491$

16. The following chart shows the number of meals served at the Gourmet Diner last week. Use addition and subtraction to fill in the blank spaces. What is the week's grand total?

Gourmet Diner

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday		Total Units
Breakfast	82	___	68	57	72	92		427
Lunch	29	69	61	___	82	75		____
Dinner	96	103	71	108	112	159		____
Daily Totals	___	___	___	223	___	___	**Grand Total**	____

17. You are the bookkeeper for the Gourmet Diner in Exercise 16. If breakfasts average $6 each, lunches average $9 each, and dinners average $13 each, calculate the total dollar sales for last week.

© mewini/Shutterstock.com

Although the peak years for diners have long since passed, many diners still exist and other restaurants have taken the inspiration from the original diners.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

CHAPTER 1

18. The stadium parking lot at Fairview College contained 5,949 cars last Saturday for the homecoming football game.

a. If there are 3 entrances to the lot, what was the average number of cars that came through each entrance?

b. If, on average, each car brought 4 people and 2,560 people walked to the stadium from the dormitories and fraternity houses, how many people attended the game?

EXCEL 1

19. Camp Minnewonka, a summer camp in the Rocky Mountains, has budgeted $85,500 for a new fleet of sailboats. The boat selected is a deluxe model costing $4,500.

a. How many boats can be purchased by the camp?

b. If, instead, a standard model was chosen costing $3,420, how many boats could be purchased?

20. Facebook reported that for one three-month period, approximately 2.1 billion photos were uploaded to their site each week. That averages to about 3,500 photographs per second!

a. At that rate, how many photographs are uploaded per hour?

b. Write the number of photographs per hour in word form.

21. You are in charge of organizing the annual stockholders' meeting and luncheon for your company, Tundra Industries, Inc. The meal costs $13 per person, entertainment costs $2,100, facility rental is $880, invitations and annual report printing costs are $2,636, and other expenses come to $1,629. If 315 stockholders plan to attend,

a. What is the total cost of the luncheon?

b. What is the cost per stockholder?

© Tomislav Konestabo/Shutterstock.com

Facebook Facebook's company information indicates that it is now available in more than 70 languages. Approximately 80% of their monthly active users are outside the United States and Canada.

22. A study tracking the history of home-schooling found that 2,040,000 students were home-schooled in 2010 compared with 850,000 students in 1999. How many more students were home-schooled in 2010 than 1999?

23. Katie Jergens had $868 in her checking account on April 1. During the month, she wrote checks for $15, $123, $88, $276, and $34. She also deposited $45, $190 and $436. What is the balance in her checking account at the end of April?

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

CHAPTER 1

24. A banana nut bread recipe calls for 2 cups of flour. If 4 cups of flour weigh a pound, how many recipes can be made from a 5-pound bag of flour?

25. Brian Hickman bought 2,000 shares of stock at $62 per share. Six months later he sold the 2,000 shares at $87 per share. If the total stockbroker's commission was $740, how much profit did he make on this transaction?

EXCEL 2

26. The Canmore Mining Company produces 40 tons of ore in an 8-hour shift. The mine operates continuously—3 shifts per day, 7 days per week. How many tons of ore can be extracted in 6 weeks?

Courtesy of Bob Brechner

Alaskan Fishing Boats According to the Alaska Department of Fish & Game, Alaska supports one of the most productive commercial fishing economies in the world, with more than 9,600 licensed vessels as well as 20,500 licensed crewmembers.

Alaskan fishermen typically receive well over $1 billion for their catch, while the value of Alaskan seafood sold at first wholesale easily tops $2 billion per year.

27. Last week the *More Joy,* a commercial fishing boat in Alaska, brought in 360 pounds of salmon, 225 pounds of halibut, and 570 pounds of cod. At the dock, the catch was sold to Pacific Seafood Wholesalers. The salmon brought $3 per pound; the halibut, $4 per pound; and the cod, $5 per pound. If fuel and crew expenses amounted to $1,644, how much profit did Captain Bob make on this trip?

28. The Iberia Corporation purchased a new warehouse for $165,000. After a down payment of $45,600, the balance was paid in equal monthly payments, with no interest.

a. If the loan was paid off in 2 years, how much were the monthly payments?

b. If the loan was paid off in 5 years, how much *less* were the monthly payments?

29. A flatbed railroad car weighs 150 tons empty and 420 tons loaded with 18 equal-weight trailers. How many tons does each trailer weigh?

EXCEL 3

30. The Spring Creek Police Department has been asked to provide protection support for a visiting politician. If it has to provide 2 officers at the airport for motorcycle escort, 7 officers for intersection control along the planned route of travel, and 14 officers at the high school auditorium during the speech,

a. How many officers are to be assigned to the protection detail?

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

CHAPTER 1

b. If each officer is to be paid $75 extra for this duty, what is the total officer payroll for the protection detail?

31. The following ad for Tire King shows the original and sale prices of certain tires. If 2 tires of each size are to be bought, what will be the total amount saved by purchasing at the sale prices rather than at the original prices?

Tire Size	Original Price	Sale Price
14 in.	$36	$32
15 in.	$40	$34

32. John Rock has narrowed down his selection of a new cell phone to two models with similar features. Model 800 is plug-compatible with his existing car charger and remote earbud/microphone and will cost $140. There is a $35 mail-in rebate for the Model 800. His other choice is the Model 300, which is not plug-compatible with his existing accessories. The price of the Model 300 is $89, and it has a $20 mail-in rebate. But if he buys the Model 300, he will also have to buy the car charger for $30 and an earbud/microphone for $23.

a. All considered, which model would be the least expensive choice? By how much?

b. For either cell phone choice, the monthly charge will be $34 per month with a $5 rebate if fewer than 250 minutes are used during the month. Government fees and taxes will be $9, the access fee is $7, and the Internet connection charge is $15. Based on last year's usage, John estimates that he will use fewer than 250 minutes in May, June, August, and October. If John's service starts on January 1, how much will he spend in the next year on cellular phone services?

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

CHAPTER 1

Business Decision: Cirque du Soleil – Acrobatic Magic

© Randy Miramontez/Shutterstock.com

Cirque du Soleil

Cirque du Soleil (French for "Circus of the Sun," in English pronounced Serk-doo-Solay) is a Canadian entertainment company, self-described as a "dramatic mix of circus arts and street entertainment." Starting with 20 street performers and 73 employees in 1984, Cirque du Soleil today employs more than 4,000 people from 40 different countries.

Since 1984, Cirque shows have visited more than 200 cities around the world. Nearly 200 million people have seen at least one Cirque du Soleil show.

33. As a professional event planner, you have been hired to put together a family reunion at a local performance of Cirque du Soleil. There will be 25 adults, 30 children, and 15 senior citizens attending the reunion.

a. Assuming a ticket budget of $6,500, use the price schedule below to determine the *best* ticket level available for the reunion without going over the budget.

Ticket Prices

Ticket Level	Adult	Child	Senior
1—Premium	$125	$88	$115
2—Standard	$95	$66	$85
3—Budget	$85	$59	$76

b. In addition to the tickets, each person is expected to average $8 in food costs and $29 in bus transportation charges. Your service fee is $250. Calculate the total cost of the reunion.

Collaborative Learning Activity

Using Math in Business

1. As a team, discuss and list the ways that math is used in the following types of business. Report your findings to the class.

a. Supermarket
b. Car dealership
c. Beauty salon
d. Dog-walking service
e. Restaurant
f. Additional team choice _____

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

CHAPTER 2 Fractions

Performance Objectives

SECTION I: Understanding and Working with Fractions

2-1: Distinguishing among the various types of fractions (p. 32)

2-2: Converting improper fractions to whole or mixed numbers (p. 33)

2-3: Converting mixed numbers to improper fractions (p. 34)

2-4: Reducing fractions to lowest terms using
a. inspection and the rules of divisibility (p. 35)
b. the greatest common divisor method (p. 36)

2-5: Raising fractions to higher terms (p. 37)

SECTION II: Addition and Subtraction of Fractions

2-6: Determining the least common denominator (LCD) of two or more fractions (p. 40)

2-7: Adding fractions and mixed numbers (p. 41)

2-8: Subtracting fractions and mixed numbers (p. 43)

SECTION III: Multiplication and Division of Fractions

2-9: Multiplying fractions and mixed numbers (p. 49)

2-10: Dividing fractions and mixed numbers (p. 51)

© Christy Thompson/Shutterstock.com

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

SECTION I 2 Understanding and Working with Fractions

fractions A mathematical way of expressing a part of a whole thing. For example, $\frac{1}{4}$ is a fraction expressing one part out of a total of four parts.

Fractions are a mathematical way of expressing a part of a whole thing. The word *fraction* comes from a Latin word meaning "break." Fractions result from breaking a unit into a number of equal parts. This concept is used quite commonly in business. We may look at sales for $\frac{1}{2}$ the year or reduce prices by $\frac{1}{4}$ for a sale. A new production machine in your company may be $1\frac{3}{4}$ times faster than the old one, or you might want to cut $5\frac{3}{4}$ yards of fabric from a roll of material.

Just like whole numbers, fractions can be added, subtracted, multiplied, divided, and even combined with whole numbers. This chapter introduces you to the various types of fractions and shows you how they are used in the business world.

2-1 Distinguishing among the Various Types of Fractions

numerator The number on top of the division line of a fraction. It represents the dividend in the division. In the fraction $\frac{1}{4}$, 1 is the numerator.

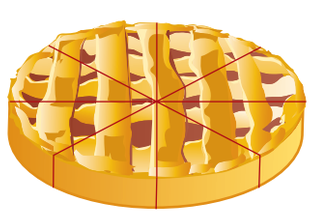
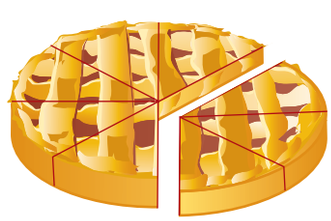
denominator The number on the bottom of the division line of a fraction. It represents the divisor in the division. In the fraction $\frac{1}{4}$, 4 is the denominator.

division line The horizontal or slanted line separating the numerator from the denominator. The symbol representing "divided by" in a fraction. In the fraction $\frac{1}{4}$, the line between the 1 and the 4 is the division line.

Technically, fractions express the relationship between two numbers set up as division. The **numerator** is the number on the top of the fraction. It represents the dividend in the division. The **denominator** is the bottom number of the fraction. It represents the divisor. The numerator and the denominator are separated by a horizontal or slanted line, known as the **division line**. This line means "divided by." For example, the fraction 2/3 or $\frac{2}{3}$, read as "two-thirds," means 2 divided by 3, or $2 \div 3$.

$$\begin{array}{l}\text{Numerator} \\ \hline \text{Denominator}\end{array} \quad \frac{2}{3}$$

Remember, fractions express parts of a whole unit. The unit may be dollars, feet, ounces, or anything else. The denominator describes how many total parts are in the unit. The numerator represents how many of the total parts we are describing or referring to. For example, an apple pie (the whole unit) is divided into eight slices (total equal parts, denominator). As a fraction, the whole pie would be represented as $\frac{8}{8}$. If five of the slices were eaten (parts referred to, numerator), what fraction represents the part that was eaten? The answer would be the fraction $\frac{5}{8}$, read "five-eighths." Because five slices were eaten out of a total of eight, three slices, or $\frac{3}{8}$, of the pie is left.

$\frac{8}{8}$  $\frac{5}{8}$  $\frac{3}{8}$

common or **proper fractions** Fractions in which the numerator is less than the denominator. Represent less than a whole unit. The fraction $\frac{1}{4}$ is a common or proper fraction.

Fractions such as $\frac{3}{8}$ and $\frac{5}{8}$, in which the numerator is smaller than the denominator, represent less than a whole unit and are known as **common** or **proper fractions**. Some examples of proper fractions are

$$\frac{3}{16} \text{ three-sixteenths} \qquad \frac{1}{4} \text{ one-fourth} \qquad \frac{9}{32} \text{ nine-thirty-seconds}$$

improper fraction A fraction in which the denominator is equal to or less than the numerator. Represents one whole unit or more. The fraction $\frac{4}{1}$ is an improper fraction.

When a fraction's denominator is equal to or less than the numerator, it represents one whole unit or more and is known as an **improper fraction**. Some examples of improper fractions are

$$\frac{9}{9} \text{ nine-ninths} \qquad \frac{15}{11} \text{ fifteen-elevenths} \qquad \frac{19}{7} \text{ nineteen-sevenths}$$

mixed number A number that combines a whole number with a proper fraction. The fraction $10\frac{1}{4}$ is a mixed number.

A number that combines a whole number with a proper fraction is known as a **mixed number**. Some examples of mixed numbers are

$$3\frac{1}{8} \text{ three and one-eighth} \qquad 7\frac{11}{16} \text{ seven and eleven-sixteenths}$$

$$46\frac{51}{60} \text{ forty-six and fifty-one-sixtieths}$$

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

EXAMPLE 1 IDENTIFYING AND WRITING FRACTIONS

For each of the following, identify the type of fraction and write it in word form.

a. $\frac{45}{16}$ b. $14\frac{2}{5}$ c. $\frac{11}{12}$

SOLUTION STRATEGY

a. $\frac{45}{16}$ This is an improper fraction because the denominator, 16, is less than the numerator, 45. In word form, we say "forty-five-sixteenths." It could also be read as "45 divided by 16" or "45 over 16."

b. $14\frac{2}{5}$ This is a mixed number because it combines the whole number 14 with the fraction $\frac{2}{5}$. In word form, this is read "fourteen and two-fifths."

c. $\frac{11}{12}$ This is a common or proper fraction because the numerator, 11, is less than the denominator, 12. This fraction is read "eleven-twelfths." It could also be read "11 over 12" or "11 divided by 12."

TRY IT EXERCISE 1

For each of the following, identify the type of fraction and write it in word form.

a. $76\frac{3}{4}$ b. $\frac{3}{5}$ c. $\frac{18}{18}$ d. $\frac{33}{8}$

CHECK YOUR ANSWERS WITH THE SOLUTIONS ON PAGE 58.

Learning Tip

A **complex fraction** is one in which the numerator, the denominator, or both are fractions.

Examples: $\frac{\frac{2}{3}}{6}, \frac{\frac{9}{3}}{\frac{3}{4}}, \frac{\frac{7}{8}}{\frac{1}{4}}$

Can you simplify them?

(Answers: $\frac{1}{9}$, 12, $3\frac{1}{2}$)

2-2 Converting Improper Fractions to Whole or Mixed Numbers

It often becomes necessary to change or convert an improper fraction to a whole or mixed number. For example, final answers cannot be left as improper fractions; they must be converted.

STEPS FOR CONVERTING IMPROPER FRACTIONS TO WHOLE OR MIXED NUMBERS

STEP 1. Divide the numerator of the improper fraction by the denominator.

STEP 2a. If there is no remainder, the improper fraction becomes a whole number.

STEP 2b. If there is a remainder, write the whole number and then write the fraction as

$$\text{Whole number } \frac{\text{Remainder}}{\text{Divisor}}$$

EXAMPLE 2 CONVERTING FRACTIONS

Convert the following improper fractions to whole or mixed numbers.

a. $\frac{30}{5}$ b. $\frac{9}{2}$

SOLUTION STRATEGY

a. $\frac{30}{5} = 6$ When we divide the numerator, 30, by the denominator, 5, we get the whole number 6. There is no remainder.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

b. $\frac{9}{2} = 2\overline{)9} = 4\frac{1}{2}$ This improper fraction divides 4 times with a remainder of 1; therefore, it will become a mixed number. In this case, the 4 is the whole number. The remainder, 1, becomes the numerator of the new fraction; the divisor, 2, becomes the denominator.

TRY IT EXERCISE 2

Convert the following improper fractions to whole or mixed numbers.

a. $\frac{8}{3}$ b. $\frac{25}{4}$ c. $\frac{39}{3}$

CHECK YOUR ANSWERS WITH THE SOLUTIONS ON PAGE 58.

2-3 Converting Mixed Numbers to Improper Fractions

STEPS FOR CONVERTING A MIXED NUMBER TO AN IMPROPER FRACTION

STEP 1. Multiply the denominator by the whole number.
STEP 2. Add the numerator to the product from Step 1.
STEP 3. Place the total from Step 2 as the "new" numerator.
STEP 4. Place the original denominator as the "new" denominator.

EXAMPLE 3 CONVERTING FRACTIONS

Convert the following mixed numbers to improper fractions.

a. $5\frac{2}{3}$ b. $9\frac{5}{6}$

SOLUTION STRATEGY

a. $5\frac{2}{3} = \frac{17}{3}$ In this example, we multiply the denominator, 3, by the whole number, 5, and add the numerator, 2, to get 17 ($3 \times 5 + 2 = 17$). We then place the 17 over the original denominator, 3.

b. $9\frac{5}{6} = \frac{59}{6}$ In this example, we multiply the denominator, 6, by the whole number, 9, and add the numerator, 5, to get 59 ($6 \times 9 + 5 = 59$). We then place the 59 over the original denominator, 6.

TRY IT EXERCISE 3

Convert the following mixed numbers to improper fractions.

a. $2\frac{3}{4}$ b. $9\frac{1}{5}$ c. $22\frac{5}{8}$

CHECK YOUR ANSWERS WITH THE SOLUTIONS ON PAGE 58.

IN THE Business World

Certain calculators have a fraction key, $a\frac{b}{c}$, that allows you to enter fractions. For example, $\frac{2}{3}$ would be entered as [2] [$a\frac{b}{c}$] [3] and would appear as 2 ⌟ 3. The mixed fraction $25\frac{2}{3}$ would be entered as [25] [$a\frac{b}{c}$] [2] [$a\frac{b}{c}$] [3] and would appear as 25 ⌟ 2 ⌟ 3.

Fraction calculators express answers in fractional notation and are a handy tool for measuring materials without having to convert fractions to decimals. They are particularly useful in the construction, medical, and food industries.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Reducing Fractions to Lowest Terms

2-4

Reducing a fraction means finding whole numbers, called common divisors or common factors, that divide evenly into both the numerator and denominator of the fraction. For example, the fraction $\frac{24}{48}$ can be reduced to $\frac{12}{24}$ by the common divisor 2. The new fraction, $\frac{12}{24}$, can be further reduced to $\frac{4}{8}$ by the common divisor 3 and to $\frac{1}{2}$ by the common divisor 4. When a fraction has been reduced to the point where there are no common divisors left, other than 1, it is said to be **reduced to lowest terms**.

The largest number that is a common divisor of a fraction is known as the **greatest common divisor**. It reduces the fraction to lowest terms in one step. In the example of $\frac{24}{48}$ above, we could have used 24, the greatest common divisor, to reduce the fraction to $\frac{1}{2}$.

reduced to lowest terms The process of having divided whole numbers, known as common divisors or common factors, into both the numerator and denominator of a fraction. Used for expressing fractions as final answers. For example, $\frac{5}{20}$ is reduced to $\frac{1}{4}$ by the common divisor 5.

greatest common divisor The largest number that is a common divisor of a fraction. Used to reduce a fraction to lowest terms in one step. For example, 5 is the greatest common divisor of $\frac{5}{20}$.

A. REDUCING FRACTIONS BY INSPECTION

Reducing fractions by inspection or observation is often a trial-and-error procedure. Sometimes a fraction's common divisors are obvious; other times they are more difficult to determine. The following rules of divisibility may be helpful:

RULES OF DIVISIBILITY

A Number Is Divisible by	Conditions
2	If the last digit is 0, 2, 4, 6, or 8.
3	If the sum of the digits is divisible by 3.
4	If the last two digits are divisible by 4.
5	If the last digit is 0 or 5.
6	If the number is divisible by 2 and 3 or if it is even and the sum of the digits is divisible by 3.
8	If the last three digits are divisible by 8.
9	If the sum of the digits is divisible by 9.
10	If the last digit is 0.

© Diego Cervo/Shutterstock.com

Construction workers must accurately measure and calculate various lengths of building materials by using fractions.

EXAMPLE 4 REDUCING FRACTIONS TO LOWEST TERMS USING INSPECTION

Use observation and the rules of divisibility to reduce $\frac{48}{54}$ to lowest terms.

SOLUTION STRATEGY

$\frac{48}{54} = \frac{48 \div 2}{54 \div 2} = \frac{24}{27}$ Because the last digit of the numerator is 8 and the last digit of the denominator is 4, they are both divisible by 2.

$\frac{24}{27} = \frac{24 \div 3}{27 \div 3} = \frac{8}{9}$ Because the sum of the digits of the numerator, $2 + 4$, and the denominator, $2 + 7$, are both divisible by 3, the fraction is divisible by 3.

$\frac{48}{54} = \frac{8}{9}$ Because no numbers other than 1 divide evenly into the new fraction $\frac{8}{9}$, it is now reduced to lowest terms.

TRY IT EXERCISE 4

Reduce the following fractions to lowest terms.

a. $\frac{30}{55}$ b. $\frac{72}{148}$

CHECK YOUR ANSWERS WITH THE SOLUTIONS ON PAGE 58.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

B. REDUCING FRACTIONS BY THE GREATEST COMMON DIVISOR METHOD

The best method for reducing a fraction to lowest terms is to divide the numerator and the denominator by the greatest common divisor because this accomplishes the task in one step. When the greatest common divisor is not obvious to you, use the following steps to determine it:

STEPS FOR DETERMINING THE GREATEST COMMON DIVISOR OF A FRACTION

STEP 1. Divide the numerator of the fraction into the denominator.

STEP 2. Examine the remainder.

- If it is 0, stop. The divisor is the greatest common divisor.
- If it is 1, stop. The fraction cannot be reduced and is therefore in lowest terms.
- If it is another number, divide the remainder into the divisor.

STEP 3. Repeat Step 2 as needed.

EXAMPLE 5 REDUCING FRACTIONS TO LOWEST TERMS USING THE GREATEST COMMON DIVISOR METHOD

Reduce the fraction $\frac{63}{213}$ by finding the greatest common divisor.

SOLUTION STRATEGY

$$\begin{array}{r} 3 \\ 63\overline{)231} \\ 189 \\ \hline 42 \end{array}$$

Divide the numerator, 63, into the denominator, 231. This leaves a remainder of 42.

$$\begin{array}{r} 1 \\ 42\overline{)63} \\ 42 \\ \hline 21 \end{array}$$

Next, divide the remainder, 42, into the previous divisor, 63. This leaves a remainder of 21.

$$\begin{array}{r} 2 \\ 21\overline{)42} \\ 42 \\ \hline 0 \end{array}$$

Then divide the remainder, 21, into the previous divisor, 42. Because this leaves a remainder of 0, the last divisor, 21, is the greatest common divisor of the original fraction.

$$\frac{63 \div 21}{231 \div 21} = \frac{3}{11}$$

By dividing both the numerator and the denominator by the greatest common divisor, 21, we get the fraction, $\frac{3}{11}$, which is the original fraction reduced to lowest terms.

TRY IT EXERCISE 5

Reduce the following fractions to lowest terms.

a. $\frac{270}{810}$ b. $\frac{175}{232}$

CHECK YOUR ANSWERS WITH THE SOLUTIONS ON PAGE 58.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Raising Fractions to Higher Terms

2-5

Raising a fraction to higher terms is a procedure sometimes needed in addition and subtraction. It is the opposite of reducing fractions to lower terms. In reducing, we used common divisors; in raising fractions, we use common multiples. To **raise to higher terms**, simply multiply the numerator and denominator of a fraction by a **common multiple**.

For example, if we want to raise the numerator and denominator of the fraction $\frac{3}{4}$ by factors of 7, multiply the numerator and the denominator by 7. This procedure raises the fraction to $\frac{21}{28}$.

$$\frac{3 \times 7}{4 \times 7} = \frac{21}{28}$$

It is important to remember that the value of the fraction has not changed by raising it; we have simply divided the "whole" into more parts.

raise to higher terms The process of multiplying the numerator and denominator of a fraction by a common multiple. Sometimes needed in addition and subtraction of fractions. For example, $\frac{5}{20}$ is the fraction $\frac{1}{4}$ raised to higher terms, twentieths, by the common multiple 5.

common multiple Whole number used to raise a fraction to higher terms. The common multiple 5 raises the fraction $\frac{1}{4}$ to $\frac{5}{20}$.

STEPS FOR RAISING A FRACTION TO A NEW DENOMINATOR

STEP 1. Divide the original denominator into the new denominator. The resulting quotient is the common multiple that raises the fraction.

STEP 2. Multiply the numerator and the denominator of the original fraction by the common multiple.

EXAMPLE 6 RAISING FRACTIONS TO HIGHER TERMS

Raise the following fractions to higher terms as indicated.

a. $\frac{2}{3}$ to fifteenths b. $\frac{3}{5}$ to fortieths

SOLUTION STRATEGY

a. $\frac{2}{3} = \frac{?}{15}$ In this example, we are raising the fraction $\frac{2}{3}$ to the denominator 15.

$15 \div 3 = 5$ Divide the original denominator, 3, into 15. This yields the common multiple 5.

$\frac{2 \times 5}{3 \times 5} = \frac{10}{15}$ Now multiply both the numerator and the denominator by the common multiple, 5.

b. $\frac{3}{5} = \frac{?}{40}$ Here the indicated denominator is 40.

$40 \div 5 = 8$ Dividing 5 into 40, we get the common multiple 8.

$\frac{3 \times 8}{5 \times 8} = \frac{24}{40}$ Now raise the fraction by multiplying the numerator, 3, and the denominator, 5, by 8.

TRY IT EXERCISE 6

Raise the following fractions to higher terms as indicated.

a. $\frac{7}{8}$ to sixty-fourths b. $\frac{3}{7}$ to thirty-fifths

CHECK YOUR ANSWERS WITH THE SOLUTIONS ON PAGE 59.

Learning Tip

Sometimes it is difficult to determine which of two fractions is the larger or smaller number. By converting them to **like fractions** (same denominator), the answer will become evident.

For example:

Which fraction is larger, $\frac{4}{5}$ or $\frac{5}{6}$?

$\frac{4}{5} = \frac{24}{30}$, whereas $\frac{5}{6} = \frac{25}{30}$

Therefore, $\frac{5}{6}$ is larger than $\frac{4}{5}$.

Copyright 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.