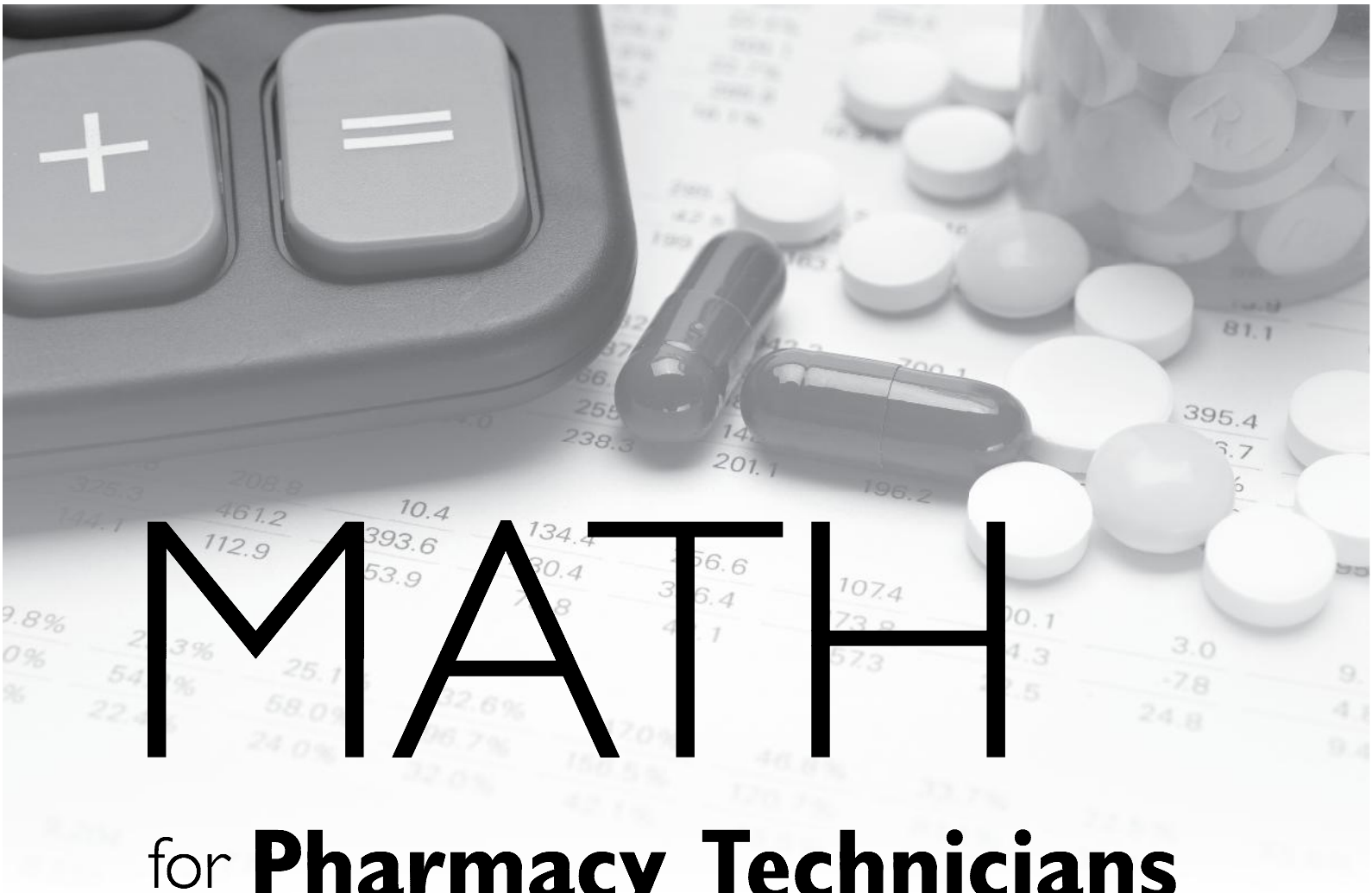

MATH

for **Pharmacy Technicians**

SECOND EDITION

Lorraine Zentz
Pharmacy Technician Program
ed2go/GES

JONES & BARTLETT
LEARNING

25408_FMxx_Zentz_6329.indd 1 3/11/13 2:42 PM

World Headquarters
Jones & Bartlett Learning
5 Wall Street
Burlington, MA 01803
978-443-5000
info@jblearning.com
www.jblearning.com

Jones & Bartlett Learning books and products are available through most bookstores and online booksellers. To contact Jones & Bartlett Learning directly, call 800-832-0034, fax 978-443-8000, or visit our website, www.jblearning.com.

Substantial discounts on bulk quantities of Jones & Bartlett Learning publications are available to corporations, professional associations, and other qualified organizations. For details and specific discount information, contact the special sales department at Jones & Bartlett Learning via the above contact information or send an email to specialsales@jblearning.com.

Copyright © 2014 by Jones & Bartlett Learning, LLC, an Ascend Learning Company

All rights reserved. No part of the material protected by this copyright may be reproduced or utilized in any form, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without written permission from the copyright owner.

The content, statements, views, and opinions herein are the sole expression of the respective authors and not that of Jones & Bartlett Learning, LLC. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not constitute or imply its endorsement or recommendation by Jones & Bartlett Learning, LLC and such reference shall not be used for advertising or product endorsement purposes. All trademarks displayed are the trademarks of the parties noted herein. *Math for Pharmacy Technicians, Second Edition* is an independent publication and has not been authorized, sponsored, or otherwise approved by the owners of the trademarks or service marks referenced in this product.

There may be images in this book that feature models; these models do not necessarily endorse, represent, or participate in the activities represented in the images. Any screenshots in this product are for educational and instructive purposes only. Any individuals and scenarios featured in the case studies throughout this product may be real or fictitious, but are used for instructional purposes only.

The author, editor, and publisher have made every effort to provide accurate information. However, they are not responsible for errors, omissions, or for any outcomes related to the use of the contents of this book and take no responsibility for the use of the products and procedures described. Treatments and side effects described in this book may not be applicable to all people; likewise, some people may require a dose or experience a side effect that is not described herein. Drugs and medical devices are discussed that may have limited availability controlled by the Food and Drug Administration (FDA) for use only in a research study or clinical trial. Research, clinical practice, and government regulations often change the accepted standard in this field. When consideration is being given to use of any drug in the clinical setting, the health care provider or reader is responsible for determining FDA status of the drug, reading the package insert, and reviewing prescribing information for the most up-to-date recommendations on dose, precautions, and contraindications, and determining the appropriate usage for the product. This is especially important in the case of drugs that are new or seldom used.

Production Credits
Publisher: William Brottmiller
Senior Acquisitions Editor: Katey Birtcher
Associate Editor: Teresa Reilly
Editorial Assistant: Sean Fabery
Production Editor: Jessica Steele Newfell
Marketing Manager: Grace Richards
VP, Manufacturing and Inventory Control: Therese Connell
Composition: Publishers' Design and Production Services, Inc.
Cover Design: Kristin E. Parker
Cover and Title Page Image: © chuckstock/ShutterStock, Inc.
Printing and Binding: Edwards Brothers Malloy
Cover Printing: Edwards Brothers Malloy

To order this product, use ISBN: 978-1-284-03139-3

Library of Congress Cataloging-in-Publication Data
Zentz, Lorraine C.
Math for pharmacy technicians / Lorraine C. Zentz. — 2nd ed.
p. ; cm.
Includes index.
ISBN 978-1-284-02540-8 (pbk. : alk. paper)
I. Title.
[DNLM: 1. Drug Dosage Calculations. 2. Mathematics. 3. Pharmaceutical Preparations—administration & dosage. QV 748]
RS57
615′.1401513—dc23
2013005025
6048

Printed in the United States of America
17 16 15 14 13 10 9 8 7 6 5 4 3 2 1

Contents

Introduction v

Chapter 1 Fundamentals of Math 1
OBJECTIVES 1
ARABIC NUMERALS 1
ROMAN NUMERALS 2
Practice Problems 1.1 3
METRIC SYSTEM 4
Practice Problems 1.2 6
Practice Problems 1.3 8
METRIC CONVERSIONS 8
Practice Problems 1.4 9
APOTHECARY SYSTEM 9
Practice Problems 1.5 10
CHAPTER 1 QUIZ 11

Chapter 2 Fractions and Decimals 13
OBJECTIVES 13
FRACTIONS 13
Addition and Subtraction 14
Practice Problems 2.1 17
Multiplication and Division 17
Practice Problems 2.2 18
DECIMALS 18
Addition and Subtraction 19
Multiplication 19
Division 19
Rounding 20
Practice Problems 2.3 21
Significant Figures 21
Practice Problems 2.4 22
CHAPTER 2 QUIZ 22

Chapter 3 Ratio, Proportions, and Percents 25
OBJECTIVES 25
RATIOS 25
Practice Problems 3.1 27
PROPORTIONS 27
Practice Problems 3.2 30
PERCENTS 31
CONVERSIONS 32
Ratio to Percent 32
Decimal to Percent 32
Practice Problems 3.3 33
CHAPTER 3 QUIZ 34

Chapter 4 Liquid Measures 37
OBJECTIVES 37
INTRODUCTION 37
DENSITY 37
SPECIFIC GRAVITY 38
CHAPTER 4 QUIZ 39

Chapter 5 Concentrations 41
OBJECTIVES 41
WEIGHT/WEIGHT 41
VOLUME/VOLUME 42
WEIGHT/VOLUME 43
Practice Problems 5.1 44
RATIO STRENGTH 44
Practice Problems 5.2 46
CHAPTER 5 QUIZ 46

25408_FMxx_Zentz_6329.indd 3 3/11/13 2:42 PM

Chapter 6 Dilutions 49
OBJECTIVES 49
STOCK SOLUTIONS/SOLIDS 49
LIQUID DILUTIONS 50
SOLID DILUTIONS 51
Practice Problems 6.1 52
ALLIGATIONS 52
Practice Problems 6.2 55
CHAPTER 6 QUIZ 56

Chapter 7 Dosing 59
OBJECTIVES 59
GERIATRICS 59
PEDIATRICS 60
Practice Problems 7.1 61
CHEMOTHERAPY 62
Practice Problems 7.2 63
CHAPTER 7 QUIZ 63

Chapter 8 IV Admixture Calculations 65
OBJECTIVES 65
INTRAVENOUS MEDICATIONS 65
MILLIEQUIVALENTS 65
UNITS 66
Practice Problems 8.1 67
TPN SOLUTIONS 68
IV FLOW RATES 69
DROP SETS 70
Practice Problems 8.2 72
CHAPTER 8 QUIZ 73

Chapter 9 Business Math 75
OBJECTIVES 75
INVENTORY 75
PROFIT 76
Practice Problems 9.1 76
SELLING PRICE 76
Practice Problems 9.2 78
INSURANCE REIMBURSEMENT 78
Practice Problems 9.3 79
CHAPTER 9 QUIZ 79

Appendix A Answer Keys 81

Index 143

Introduction

Remember:
Do not rely on mental math skills—*always write equations and conversions down!* Time should not be an issue when accuracy is vital.

An essential tool for all pharmacy technicians is a full grasp of the necessary math skills needed on a daily basis in the pharmacy setting. Simply understanding the math is not enough: technicians must have the confidence to arrive at an accurate answer. While drugs can be of great help to patients, they also are powerful and potentially deadly chemicals that must be treated with the utmost respect; proper dosing is critical. Misplaced decimals, extra zeros, or "close enough" measuring are unacceptable.

Utilizing a straightforward layout, *Math for Pharmacy Technicians, Second Edition* focuses on the crucial terminology (terms and abbreviations) pertaining to calculating medication dosages. This text provides more than just the final answer: easy-to-follow explanations show how to complete math equations and conversions and boxed text (featuring tips, key points, and reminders) help students comprehend the material in a manner that will be beneficial when solving future problems both in this text and on the job.

Remember:
A calculator can be a helpful tool, but it is crucial to understand how to calculate the old-fashioned way—with pencil and paper. A calculator may help to double-check a solution, which can be beneficial in multiple-step calculations.

The basic math skills a pharmacy technician is required to understand include fractions, decimals, and percentages. In *Math for Pharmacy Technicians*, different methods are demonstrated so that technicians will feel confident in the skills they are learning. There may be several ways to reach a solution, but technicians must understand the quickest and most accurate way to reach a solution. Practice, such as focusing on the Practice Problems and Chapter Quizzes available in this text, will help to determine the method appropriate for each situation. After completing the examples and checking the answers against the Answer Key (see Appendix A), technicians will be ready to tackle math in the pharmacy setting.

25408_FMxx_Zentz_6329.indd 5 3/11/13 2:42 PM