This textbook is dedicated to math teachers everywhere (especially those who taught our kids). Although this subject is old, we know that to make it interesting requires original thinking, long hours, and sometimes even receiving telephone calls in the wee hours of the morning. So, thank you!

*Joy Bellis Sakai and Leanora Kasun*
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As students enter into the study of pharmacy, they soon discover that it is a dynamic field where the roles of the pharmacist and pharmacy technician are continually evolving. This dynamism creates interest and opportunity for students who apply themselves. But even as the field changes, some things remain constant. The safety of patients is of paramount importance to anyone working in pharmacy, whether in hospital, retail, or institutional practices. A thorough understanding of basic pharmacy math and the ability to accurately perform computations continues to be a foundational skill for becoming the qualified, competent pharmacy technician that is always in demand.

This textbook is designed for pharmacy technician students enrolled in a training program, for technicians reviewing for the certification exam, and for on-site training in the workplace. It provides a complete review of the basic mathematics concepts and skills upon which a more advanced understanding of pharmacy-related topics must be built. Once the basic skills are reviewed, the student is guided through the pharmacy basics necessary for correctly interpreting prescriptions and drug orders and performing dosing calculations that technicians face in practice.

The goal in writing this text was to demystify pharmacy math, even for “math-phobic” students, by providing a stepwise approach from simple to complex pharmacy math problems built on a strong foundation of basics. After many years of teaching mathematics and pharmacy mathematics, the authors are aware that different students may connect with different approaches to math solutions. Therefore, when appropriate, different techniques for solutions are discussed.

Organization and Contents

The units and chapters of this text are organized to complement most pharmacy technician training curricula and to support the ASHP model curriculum. The chapters are divided into four units. Units progress from general and basic concepts to more specific and complex concepts.

- Unit 1, Review of Mathematics, provides an introduction to the world of pharmacy, including medication error avoidance. A complete review of foundational concepts and basic math operations follows, with an emphasis on how these concepts relate to pharmacy error prevention and patient safety.
- Unit 2, Systems of Measurement, reviews the metric system and introduces the apothecary system. Units encountered in pharmacy
practice are discussed. Students are presented with conversions within and between measuring systems, and the application of dimensional analysis is taught. Temperature conversions and military time are covered here.

- Unit 3, Preparing for Problem Solving in Pharmacy, teaches students the basics of pharmacy abbreviations and prescription reading. The student will learn to calculate quantity to dispense and to verify a DEA number using the “checksum” digit. Basic algebra is reviewed. The unit covers estimation and a system for converting a word problem to an algebraic equation. Ratios are defined, and the use of the ratio and proportion system of problem solving is covered.

- Unit 4, Dosing Calculations and Other Pharmacy Problems, covers dosing calculations, percents, and concentration calculations, compounding formulas, and IV infusion calculations. The importance of using verified patient information for calculations and estimating before calculating is re-emphasized. Business terminology is defined and applications are explained.

**Text Features and Additional Resources**

Each chapter begins with clear learning objectives to help clarify the study approach at the outset. As students are introduced to pharmacy terminology, words and phrases are defined in the text. Term definitions in the margins create a natural way to find and learn new terms during study.

*Drug Interactions*—The alteration of activity, metabolism, or excretion of one drug by another.

Key points are emphasized in the “Tech Note” highlighted boxes. This feature is designed to focus the reader’s attention on important teaching points.

> **TECH NOTE!**

(1) A zero is always included to the left of the decimal point when writing a decimal fraction. (2) A zero is never included to the right of a decimal point.

Each chapter provides multiple example problems with complete explanations. Examples move students from familiar, real-life problems to pharmacy-related problems.

**EXAMPLE**

Convert 2340 mg to g

**SOLUTION**

The new units (grams) are larger than the original units (milligrams), so divide to convert. One gram is 1000 mg, so divide by 1000, or move the decimal point three places to the left.

2340 mg = 2.340 g

Practice problems are found at the end of every chapter. Accurate solutions to odd-numbered problems are at the end of the text. Text appendices include the parts of a prescription, glossary of terms, and conversions and abbreviations tables.

Instructors will appreciate the additional resources found online through the ASHP web site. Resources include notes on the chapters for the instructor, more practice problems, and answers to all the problems. Instructors will also find ideas for extending chapter content through critical thinking questions and in-classroom activities (available at www.ashp.org/techcalculations). Suggestions for connecting math content to other areas of the pharmacy technician curriculum are provided for each chapter.

The authors and the ASHP publication team have worked hard to create a user-friendly math textbook that is accurate and covers the breadth of possible pharmacy math problems that a pharmacy technician might face. We are interested in hearing from our users and invite your feedback. Write to: The American Society of Health-System Pharmacists, 7272 Wisconsin Avenue, Bethesda, MD 20814, attention: Special Publishing.
We wonder what springs to most people’s minds when they think of writers. Perhaps someone with paper and pencil, sitting in an easy chair near a sunny window, gazing out on a pastoral scene, while the perfect sentence springs from the writer’s imagination to the page? We hate to burst any bubbles, but writing is more like a team relay race, where the book gets passed back and forth, is written, rewritten, and illustrated, all while running toward a finish line. Writing isn’t for sissies, but thanks to teamwork, it can be an interesting and fulfilling process.

We want to thank our entire team at ASHP, including the two people who originally got us started on the project, Rebecca Olson and Dana Battaglia. Many thanks go to our editorial reviewers, who provided great suggestions for improvement. Most especially, thanks to Ruth Bloom and Bill Fogle who, in spite of joining the team late, got us over the finish line in record time.

Last, but certainly not least, thanks to our husbands and families who supported us with patience and dinner on numerous occasions. Having said how much help we got from the team, we need to state that any errors in the text are our responsibility.

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