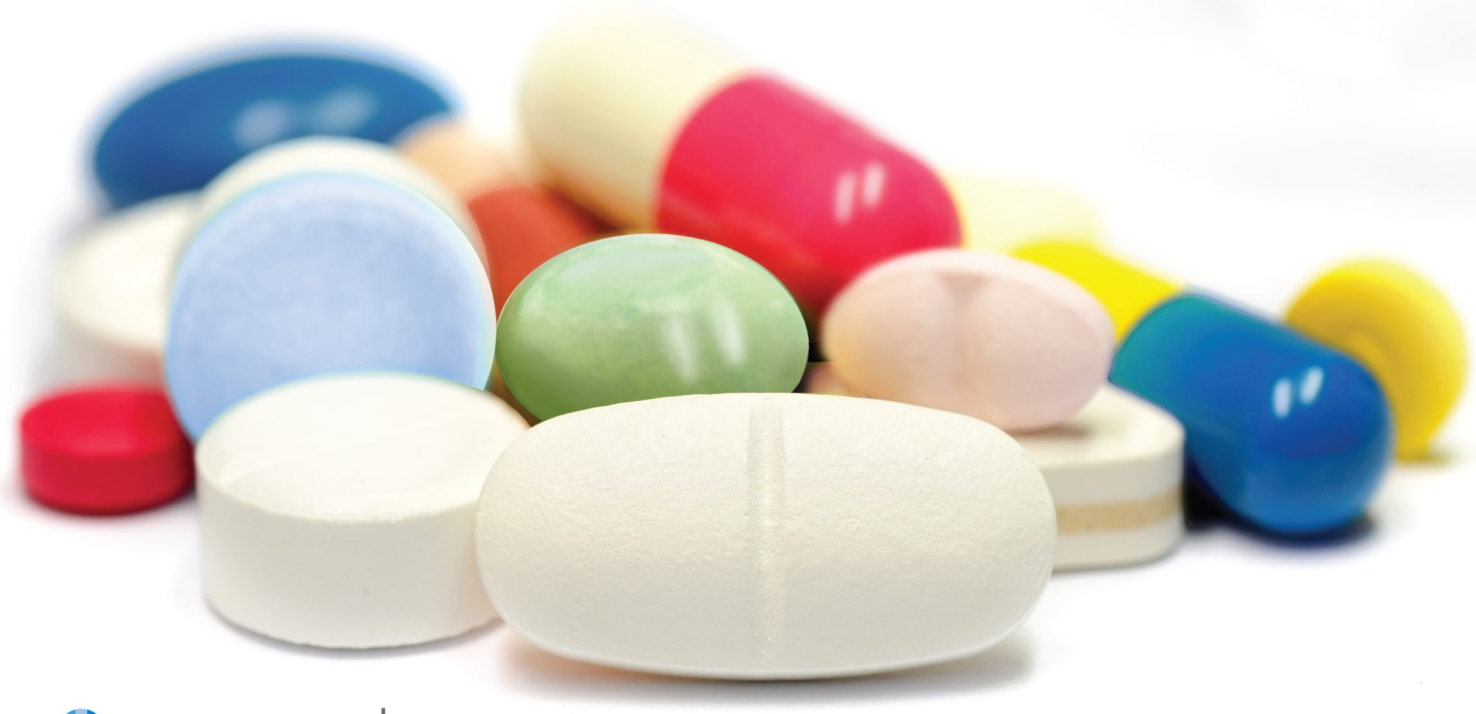
CRAIG CLINICAL CALCULATIONS MADE EASY Fifth Edition

GLORIA P. CRAIG

CLINICAL CALCULATIONS MADE EASY

Fifth Edition

SOLVING PROBLEMS USING DIMENSIONAL ANALYSIS



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APPROXIMATE EQUIVALENTS FOR METRIC, APOTHECARY, AND HOUSEHOLD WEIGHTS AND VOLUMES

APPROXIMATE EQUIVALENTS FOR WEIGHT

Metric	Apothecary
1 kg (1000 g)	2.2 lb
1 g (1000 mg)	15 gr
60 mg	1 gr

APPROXIMATE EQUIVALENTS FOR VOLUME

Metric	Apothecary	Household
4000 mL	1 gal (4 qt)	
1 L (1000 mL)	1 qt (2 pt)	
500 mL	1 pt (16 fl oz)	
240 mL	8 oz	1 cup
30 mL	1 oz (8 dr)	2 tbsp
15 mL	½ oz (4 dr)	1 tbsp (3 tsp)
5 mL	1 dr (60 M)	1 tsp (60 gtt)
1 mL	15 M	15 gtt
	1 M	1 gtt

CELSIUS AND FAHRENHEIT TEMPERATURE EQUIVALENTS

** Conversion Chart ** Celsius	to Fahrenheit
35.0	95.0
35.5	95.9
36.0	96.8
36.5	97.7
37.0	98.6
37.5	99.5
38.0	100.4
38.5	101.3
39.0	102.2
39.5	103.1
40.0	104.0
40.5	104.9
41.0	105.8
41.5	106.7
42.0	107.6

To convert from Fahrenheit to Celsius:
°C = (**°F** − 32) ÷ 1.8

To convert from Celsius to Fahrenheit:
°F = **°C** × 1.8 + 32

°C = temperature in degrees Celsius
°F = temperature in degrees Fahrenheit

Clinical Calculations Made Easy

FIFTH EDITION

Solving Problems Using Dimensional Analysis

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Preface

Many people experience stumbling blocks calculating math problems because of a lack of mathematical ability or associated "math anxiety." Even people with strong math skills often set up medication problems incorrectly, putting the patient at an increased risk for incorrect dosages and the ensuing consequences. However, dosage calculation need not be difficult if you use a problem-solving method that is easy to understand and to implement.

As a student, I experienced anxiety related to poor mathematical abilities and consequently had difficulty with medication calculations. However, a friend introduced me to a problem-solving method that was easy to visualize. By using this method, I was able to easily understand medication problems and thereby avoid the stumbling blocks that I had experienced with other methods of dosage calculations. Later, as a practicing nurse and nursing instructor, I realized that many of my colleagues and students shared my experience with "math anxiety," so I began sharing this problem-solving method with them.

During my baccalaureate nursing education, this problem-solving method became my teaching plan. During my master's education, it became my research. During my doctoral education, it became my dissertation. Now, I would like to share this method with anyone who ever believed that they were mathematically "challenged" or trembled at the thought of solving a medication problem.

The method, called dimensional analysis (also known as factor-label method or conversion-factor method), is a systematic, straightforward approach to setting up and solving problems that require conversions. It is a way of thinking about problems that can be used when two quantities are directly proportional to each other, but one needs to be converted using a conversion factor in order for the problem to be solved.

Dimensional Analysis as a Teaching Tool

Dimensional analysis empowers the learner to solve a variety of medication problems using just one problem-solving method. Research has shown that students experience less frustration and create fewer *medication errors* if one problem-solving method is used to solve *all* medication problems. As a method of reducing errors and improving calculation *abilities,* dimensional analysis has many possibilities. Whether it is used in practice or education, it is a strong approach when the goals are improving medication dosage-calculation skills, reducing medication errors, and improving patient safety. Ultimately, this improved methodology has the potential to reduce the medication errors that occur within the discipline of nursing.

Dimensional analysis helps the learner see and understand the significance of the whole process, since it focuses on how to learn, rather than what to learn. It provides a framework for understanding the principles of the problem-solving method and supports the critical thinking process. It helps the learner to organize and evaluate data, and to avoid errors in setting up problems. Dimensional analysis thus supports the conceptual mastery and higher-level thinking skills that have become the core of curricula at all levels of nursing education.

Organization of the Text

This text uses the simple-to-complex approach in teaching students clinical calculations and is, therefore, divided into four sections.

Section 1: Clinical Calculations

Chapter 1 provides an arithmetic pretest to help gauge the amount of time a student will need to spend reviewing the basic arithmetic skills presented in this chapter.

Chapter 2 reviews systems of measurement, common equivalents, calculating patient intake and output, and converting standard time and military time.
Chapter 3 introduces the student to dimensional analysis and uses common equivalents to help the student practice problem solving with this new method.
Chapter 4 builds on the previous chapter by introducing one-factor conversions.
Chapter 5 continues the growth process by presenting two-factor conversions.
Chapter 6 completes the student's understanding of clinical calculations by introducing three-factor conversions.

Section 2: Practice Problems

Section 2 allows the student the opportunity to refine the skills presented in section 1 by providing additional one-, two-, and three-factor practice problems followed by comprehensive questions to ensure accurate understanding of clinical calculations.

Section 3: Case Studies

Section 3 helps the student relate dosage calculations to real clinical situations. Thirty-five case studies that are related to different fields of nursing are included in this section.

Section 4: Comprehensive Post-Test

Section 4 contains a post-test of 20 questions allowing the instructor to assess the student's mastery of solving clinical calculations using dimensional analysis. The answers to these questions as well as additional post-tests are available to instructors on thePoint.

Special Features

Each chapter in *Section 1* contains *numerous* **Examples** with detailed explanations. **Thinking It Through** provides additional explanations to help students more fully understand complex topics. *In-chapter* **Exercises** occur after the presentation and explanation of each new concept, providing an opportunity for the student to gain ability and confidence in the material before proceeding to the next concept. Additional **Practice Problems** are provided at the end of the chapter so that students can practice the skills and assess areas where more review may be necessary. An **Answer Key** for all Exercises and Practice Problems is also located at the end of each chapter. Additionally, a **Post-Test**, designed so that students can tear it out of the book and hand it in to their instructor, appears at the end of each chapter. Additional Post-Tests and answers are available to instructors on thePoint.

In addition:

- **Actual drug labels** are liberally used throughout the text to provide the student with clinically realistic examples.

- A special feature, **Preventing Medication Errors,** helps identify key concepts necessary for avoiding clinical calculation errors.

- A special icon identifying **pediatric medication problems** allows students and teachers to quickly find all pediatric problems in the text.

New to This Edition

The fifth edition provides many more opportunities for students to practice their skills. **More problems** have been added throughout the text and all problems have been updated to follow **guidelines from the Institute for Safe Medication Practices. Calculation of intake and output** and converting **standard time and military time** are included to aid students in learning accurate medical recording. **Ten new case studies** *including pediatric problems* have also been added as well as a **new Comprehensive Post-Test.**

Resources on thePoint

thePoint (http://thepoint.lww.com), a trademark of Wolters Kluwer Health, is a web-based course and content management system providing every resource that instructors and students need in one easy-to-use site. Advanced technology and superior content combine at thePoint to allow instructors to design and deliver on-line and off-line courses, maintain grades and class rosters, and communicate with students.

Instructors will also find

- Additional Post-Tests Answer keys
- Instructor's Manual
- PowerPoint presentations

Students can visit thePoint to access supplemental multimedia resources to enhance their learning experience, download content, upload assignments, and join an on-line study group.

Also available to students are

- Additional practice problems
- Additional post-tests

By using this text and all of its resources, it is my hope that this fifth edition will help students find that clinical calculation can indeed be made easy using dimensional analysis.

GLORIA P. CRAIG

Acknowledgments

There are many people who have assisted me with my professional growth and development, including:

Pauline Callahan, who believed that I would be a great nurse and nursing instructor when I could not believe in myself.

Jackie Kehm, who introduced me to dimensional analysis and helped me pass the medication module that I was sure would be my stumbling block.

Dr. Sandra L. Sellers, for her expertise and guidance throughout the process of writing my thesis and dissertation and her encouragement to write a textbook.

Margaret Cooper, for her friendship and editing support throughout the writing of this textbook.

My students, colleagues, and reviewers, for helping me develop my abilities to explain and teach the problem-solving method of dimensional analysis.

The numerous pharmaceutical companies listed throughout this book that supplied medication labels and gave permission for the labels to be included in this textbook.

The faculty at South Dakota State University, College of Nursing, for allowing dimensional analysis to be integrated into the curriculum as the problem-solving method for medication calculation.

The Lippincott editorial and production teams, for all of their hard work: **Hilarie Surrena,** Senior Acquisitions Editor; **Eric Van Osten and Michelle Clarke,** Product Managers; and **Joan Wendt,** Design Coordinator.

To these people and many more, I would like to express my sincere appreciation for their mentoring, guidance, support, and encouragement that have helped to turn a dream into a reality.

This fifth edition of my text is dedicated to my children, **Lori (and her husband, Michael) and Randy (and his wife Samantha),** and to my granddaughters, **Zoë, Ava, and Lily.**

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Clinical Calculations

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2. XI = _____
3. 17 = _____
4. XVI = _____

Multiplying and Dividing Fractions

5. $\frac{2}{8} \times \frac{2}{2} =$
6. $\frac{2}{5} \div \frac{1}{10} =$
7. $\frac{2}{6} \times \frac{1}{2} =$
8. $\frac{1}{3} \div \frac{3}{9} =$
9. $\frac{3}{4} \times \frac{2}{3} =$
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Multiplying and Dividing Decimals

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19. $1.2 \times 2 =$
20. $1.5 \div 0.75 =$

CHAPTER 1

Arithmetic Review

Objectives

After completing this chapter, you will successfully be able to:

1. Express Arabic numbers as Roman numerals.
2. Express Roman numerals as Arabic numbers.
3. Identify the numerator and denominator in a fraction.
4. Multiply and divide fractions.
5. Multiply and divide decimals.
6. Convert fractions to decimals.

Outline

Every nurse must know and practice the six rights of medication administration including the

1. Right drug
2. Right dose
3. Right route
4. Right time
5. Right patient
6. Right documentation

Although the right drug, route, time, patient, and documentation may be readily identified, the right dose requires **arithmetic skills** that may be difficult for you. This chapter reviews the basic arithmetic skills (multiplication and division) **necessary for calculating** medication dosage problems using the problem-solving method of dimensional analysis. Calculating the **right dose** of medication to be administered to a patient is one of the first steps toward preventing **medication errors.**

PREVENTING MEDICATION ERRORS

Correctly identifying Roman numerals will assist in preventing **medication errors.** Some medication orders may include a Roman numeral.

Example: Administer X gr of aspirin, which is correctly interpreted as administer 10 gr of aspirin.

However, according to the Institute for Safe Medication Practices (ISMP), abbreviations increase the risk of medication errors. Additionally, while some health care providers may still use roman numerals and the apothecaries' system, the ISMP recommends using the metric system.

ARABIC NUMBERS AND ROMAN NUMERALS

Most medication dosages are ordered by the physician or the nurse practitioner in the metric and household systems for weights and measures using the Arabic number system with symbols called **digits** (ie, 1, 2, 3, 4, 5). Occasionally, orders are received in the apothecaries' system of weights and measures using the Roman numeral system with numbers represented by **symbols** (ie, I, V, X). The Roman numeral system uses seven basic symbols, and various combinations of these symbols represent all numbers in the Arabic number system.

Table 1.1 includes the seven basic Roman numerals and the corresponding Arabic numbers.

The combination of Roman numeral symbols is based on three specific principles:

1. Symbols are used to construct a number, but no symbol may be used more than three times. The exception is the symbol for five (V), which is used only once because there is a symbol for 10 (X) and a combination of symbols for 15 (XV).

EXAMPLE 1.1

III = (1 + 1 + 1) = 3
XXX = (10 + 10 + 10) = 30

2. When symbols of lesser value follow symbols of greater value, they are *added* to construct a number.

EXAMPLE 1.2

VIII = (5 + 3) = 8
XVII = (10 + 5 + 1 + 1) = 17

3. When symbols of greater value follow symbols of lesser value, those of lesser value are *subtracted* from those of higher value to construct a number.

EXAMPLE 1.3

IV = (5 − 1) = 4
IX = (10 − 1) = 9

TABLE 1.1 Seven Basic Roman Numerals

Roman Numerals	Arabic Numbers
I	1
V	5
X	10
L	50
C	100
D	500
M	1000

Exercise 1.1 Arabic Numbers and Roman Numerals

(See page 23 for answers)

Express the following Arabic numbers as Roman numerals.

1. 1 = _____
2. 2 = _____
3. 3 = _____
4. 4 = _____
5. 5 = _____
6. 6 = _____
7. 7 = _____
8. 8 = _____
9. 9 = _____
10. 10 = _____
11. 11 = _____
12. 12 = _____
13. 13 = _____
14. 14 = _____
15. 15 = _____
16. 16 = _____
17. 17 = _____
18. 18 = _____
19. 19 = _____
20. 20 = _____

Although medication orders rarely involve Roman numerals higher than 20, for additional practice, express the following Arabic numbers as Roman numerals.

21. 43 = _____
22. 24 = _____
23. 55 = _____
24. 32 = _____
25. 102 = _____
26. 150 = _____
27. 75 = _____

(Exercise continues on page 8)

28. 92 = _____

29. 64 = _____

30. 69 = _____

Express the following Roman numerals as Arabic numbers.

31. II = _____

32. IV = _____

33. VI = _____

34. X = _____

35. VIII = _____

36. XIX = _____

37. XX = _____

38. XVIII = _____

39. I = _____

40. XV = _____

41. III = _____

42. V = _____

43. IX = _____

44. VII = _____

45. XI = _____

46. XIV = _____

47. XVI = _____

48. XII = _____

49. XVII = _____

50. XIII = _____

To increase your abilities to use either system, convert the following Arabic numbers or Roman numerals.

51. 19 = _____

52. XII = _____

53. 7 = _____

54. IX = _____

55. IV = _____

56. 11 = _____

57. VIII = _____

58. 16 = _____
59. XX = _____
60. 5 = _____
61. I = _____
62. 18 = _____
63. VI = _____
64. 2 = _____
65. III = _____
66. 10 = _____
67. XIII = _____
68. 14 = _____
69. XV = _____
70. 17 = _____

FRACTIONS

Medication dosages with fractions are occasionally ordered by the physician or used by the pharmaceutical manufacturer on the drug label. A **fraction** is a number that represents part of a whole number and contains three parts:

1. **Numerator**—the number on the top portion of the fraction that represents the number of parts of the whole fraction.
2. **Dividing line**—the line separating the top portion of the fraction from the bottom portion of the fraction.
3. **Denominator**—the number on the bottom portion of the fraction that represents the number of parts into which the whole is divided.

$$\frac{3}{4} = \frac{\text{numerator}}{\text{denominator}}$$

To solve medication dosage calculation problems using dimensional analysis, you must be able to identify the numerator and denominator portion of the problem. You also must be able to multiply and divide numbers, fractions, and decimals.

Multiplying Fractions

The three steps for multiplying fractions are:

1. Multiply the numerators.
2. Multiply the denominators.
3. Reduce the product to the lowest possible fraction.

PREVENTING MEDICATION ERRORS

Understanding fractions will assist in preventing **medication errors.** A medication order may include a fraction.

Example: Administer 1/150 gr of nitroglycerin.

EXAMPLE 1.4

$$\frac{2}{4}\times\frac{1}{8}=\frac{2}{32}=\frac{1}{16}$$

or

$$\frac{2\,(\text{numerator})}{4\,(\text{denominator})}\times\frac{1\,(\text{numerator})}{8\,(\text{denominator})}=\frac{2\ \ (\text{numerator})}{32\,(\text{denominator})}$$

$$=\frac{1}{16}(\text{reduced to lowest possible fraction})$$

EXAMPLE 1.5

$$\frac{1}{2}\times\frac{2}{4}=\frac{2}{8}=\frac{1}{4}$$

or

$$\frac{1\,(\text{numerator})}{2\,(\text{denominator})}\times\frac{2\,(\text{numerator})}{4\,(\text{denominator})}=\frac{2\,(\text{numerator})}{8\,(\text{denominator})}$$

$$=\frac{1}{4}(\text{reduced to lowest possible fraction})$$

Exercise 1.2 Multiplying Fractions

(See pages 23–24 for answers)

To increase your abilities when working with fractions, multiply the following fractions and reduce to the lowest fractional term.

1. $\frac{3}{4}\times\frac{5}{8}=$

2. $\frac{1}{3}\times\frac{4}{9}=$

3. $\frac{2}{3}\times\frac{4}{5}=$

4. $\frac{3}{4}\times\frac{1}{2}=$

5. $\frac{1}{8}\times\frac{4}{5}=$

6. $\frac{2}{3}\times\frac{5}{8}=$

7. $\frac{3}{8} \times \frac{2}{3} =$

8. $\frac{4}{7} \times \frac{2}{4} =$

9. $\frac{4}{5} \times \frac{1}{2} =$

10. $\frac{1}{4} \times \frac{1}{8} =$

Dividing Fractions

The four steps for dividing fractions are:

1. Invert (turn upside down) the divisor portion of the problem (the second fraction in the problem).
2. Multiply the two numerators.
3. Multiply the two denominators.
4. Reduce answer to lowest term (fraction or whole number).

EXAMPLE 1.6

$$\frac{2}{4} \div \frac{1}{8} = \frac{2}{4} \times \frac{8}{1} = \frac{16}{4} = 4$$

or

$$\frac{2(\text{numerator})}{4(\text{denominator})} \div \frac{1(\text{numerator})}{8(\text{denominator})}$$

$$= \frac{2(\text{numerator}) \quad \overset{(\text{inverted fraction})}{\times 8(\text{numerator})} \quad = 16}{4(\text{denominator}) \times 1(\text{denominator}) = 4}$$

$$= 4(\text{answer reduced to lowest term})$$

EXAMPLE 1.7

$$\frac{1}{2} \div \frac{2}{4} = \frac{1}{2} \times \frac{4}{2} = \frac{4}{4} = 1$$

or

$$\frac{1(\text{numerator})}{2(\text{denominator})} \div \frac{2(\text{numerator})}{4(\text{denominator})}$$

$$= \frac{1(\text{numerator}) \quad \overset{(\text{inverted fraction})}{\times 4(\text{numerator})} \quad = 4}{2(\text{denominator}) \times 2(\text{denominator}) = 4}$$

$$= 1(\text{answer reduced to lowest term})$$

Exercise 1.3 Dividing Fractions

(See page 24 for answers)

To increase your abilities when working with fractions, divide the following fractions and reduce to the lowest fractional term.

1. $\frac{3}{4} \div \frac{2}{3} =$
2. $\frac{1}{9} \div \frac{3}{9} =$
3. $\frac{2}{3} \div \frac{1}{6} =$
4. $\frac{1}{5} \div \frac{4}{5} =$
5. $\frac{3}{6} \div \frac{4}{8} =$
6. $\frac{5}{8} \div \frac{5}{8} =$
7. $\frac{1}{8} \div \frac{2}{3} =$
8. $\frac{1}{5} \div \frac{1}{2} =$
9. $\frac{1}{4} \div \frac{1}{2} =$
10. $\frac{1}{6} \div \frac{1}{3} =$

DECIMALS

Medication orders are often written using decimals, and pharmaceutical manufacturers may use decimals when labeling medications. Therefore, you must understand the learning principles involving decimals and be able to multiply and divide decimals.

- A decimal point is preceded by a zero if not preceded by a number to decrease the chance of an error if the decimal point is missed.

EXAMPLE 1.8

0.25

- A decimal point may be preceded by a number and followed by a number.

EXAMPLE 1.9

1.25

- Numbers to the left of the decimal point are *units, tens, hundreds, thousands,* and *ten-thousands*.
- Numbers to the right of the decimal point are *tenths, hundredths, thousandths,* and *ten-thousandths*.

EXAMPLE 1.10

0.2 = 2 tenths
0.05 = 5 hundredths
0.25 = 25 hundredths
1.25 = 1 unit and 25 hundredths
110.25 = 110 units and 25 hundredths

Rounding Decimals

- Decimals may be rounded off. If the number to the right of the decimal is greater than or equal to 5, round up to the next number.
- If the number to the right of the decimal is less than 5, delete the remaining numbers.

EXAMPLE 1.11

0.78 = 0.8
0.213 = 0.2

Exercise 1.4 **Rounding Decimals**

(See page 24 for answers)

Practice rounding off the following decimals to the tenth.

1. 0.75 =
2. 0.88 =
3. 0.44 =
4. 0.23 =
5. 0.67 =
6. 0.27 =
7. 0.98 =
8. 0.92 =
9. 0.64 =
10. 0.250 =

PREVENTING MEDICATION ERRORS

Understanding the importance of a decimal point will assist in preventing **medication errors.** An improper placement of a decimal point can result in a serious medication error. According to the Institute for Safe Medication Practices (ISMP):

Trailing zeros should not be used with whole numbers.

Example: Administer 1 mg of Xanax.

If a decimal point and a zero are placed after the number (1.0 mg), the order could be misread as Administer 10 mg of Xanax.

Leading zeros should ***always*** *precede a decimal point when the dosage is not a whole number.*

Example: Administer 0.125 mg of Lanoxin.

If a zero is not placed in front of the decimal point the order could be misread as Administer 125 mg of Lanoxin.

Multiplying Decimals

When multiplying with decimals, the principles of multiplication still apply. The numbers are multiplied in columns, but the number of decimal points are counted and placed in the answer, counting places from right to left.

Thinking it Through

The answer to the problem before adding decimal points is 345 but when decimal points are correctly added (two decimal points are added to the answer, counting two places from the right to the left) then 3.45 becomes the correct answer.

EXAMPLE 1.12

2.3 (1 decimal point)
× 1.5 (1 decimal point)
115
230
3.45

Exercise 1.5 Multiplying Decimals

(See pages 24–25 for answers)

Practice multiplying the following decimals.

1. 2.5
   × 4.6

2. 1.45
   × 0.25

3. 3.9
   × 0.8

4. 2.56
   × 0.45

5. 10.65
   × 0.05

6. 1.98
   × 3.10

7. 2.75
   × 5.0

8. 5.0
   × 0.45

9. 7.50
   × 0.25

10. 2.5
    × 0.01

Dividing Decimals

When dividing with decimals, the principles of division still apply, except that the dividing number is changed to a whole number by moving the decimal point to the right. The number being divided also changes by accepting the same number of decimal point moves.

EXAMPLE 1.13

$0.5\overline{)0.75}$

Step 1 **Move decimal point one place to the right.**

Step 2

$$5\overline{)7.5}$$

$$\begin{array}{r} 1.5 \\ 5\overline{)7.5} \\ \underline{5} \\ 25 \\ \underline{25} \\ 0 \end{array}$$

1.5

Exercise 1.6 **Dividing Decimals**

(See pages 25–27 for answers)

Practice dividing the following decimals and rounding the answers to the tenth.

1. $3.4\overline{)9.6}$
2. $0.25\overline{)12.50}$
3. $0.56\overline{)18.65}$
4. $0.3\overline{)0.192}$
5. $0.4\overline{)12.43}$
6. $0.5\overline{)12.50}$
7. $0.125\overline{)0.25}$
8. $0.08\overline{)0.085}$
9. $1.5\overline{)22.5}$
10. $5.5\overline{)16.5}$

CONVERTING FRACTIONS TO DECIMALS

When problem solving with dimensional analysis, medication dosage calculation problems may frequently contain both fractions and decimals. Some of you may have fraction phobia and prefer to convert fractions to decimals when solving problems. To convert a fraction to a decimal, divide the numerator portion of the fraction by the denominator portion of the fraction.

When dividing fractions, remember to add a decimal point and a zero if the numerator cannot be divided by the denominator.

PREVENTING MEDICATION ERRORS

Understanding the importance of converting fractions to decimals will assist in preventing **medication errors.** Many medication errors occur because of a simple arithmetic error with dividing. Every nurse should have a calculator to recheck answers for accuracy. If a recheck results in a different answer, the next recheck should include consulting with another nurse or pharmacist.

EXAMPLE 1.14

$$\frac{1}{2} \text{ or } \frac{1 \text{ (numerator)}}{2 \text{ (denominator)}} = 2\overline{)1.0} = 0.5$$

$$\underline{10}$$

EXAMPLE 1.15

$$\frac{3}{4} \text{ or } \frac{3 \text{ (numerator)}}{4 \text{ (denominator)}} = 4\overline{)3.00} = 0.75$$

$$\underline{28}$$

$$20$$

$$\underline{20}$$

Exercise 1.7 Converting Fractions to Decimals

(See pages 27–28 for answers)

To decrease fraction phobia, practice converting the following fractions to decimals. Remember to follow the rules of rounding.

1. $\frac{1}{8} =$

2. $\frac{1}{4} =$

3. $\frac{2}{5} =$

4. $\frac{3}{5} =$

5. $\frac{2}{3} =$

6. $\frac{6}{8} =$

7. $\frac{3}{8} =$

8. $\frac{1}{3} =$

9. $\frac{3}{6} =$

10. $\frac{2}{10} =$

Summary

This chapter has reviewed basic arithmetic that will assist you to successfully implement dimensional analysis as a problem-solving method for medication dosage calculations. To assess your understanding and retention, complete the following practice problems.

Practice Problems for Chapter 1 — Arithmetic Review

(See pages 28–30 for answers)

Change the following Arabic numbers to Roman numerals.

1. 2 =
2. 4 =
3. 5 =
4. 14 =
5. 19 =
6. 16 =

Change the following Roman numerals to Arabic numbers.

7. VI =
8. IX =
9. XII =
10. XVII =
11. XIX =
12. XXV =

Multiply the following fractions and reduce the answer to the lowest fractional term.

13. $\frac{3}{4} \times \frac{2}{5} =$
14. $\frac{2}{3} \times \frac{5}{8} =$
15. $\frac{1}{2} \times \frac{2}{3} =$
16. $\frac{7}{8} \times \frac{1}{3} =$
17. $\frac{4}{5} \times \frac{2}{7} =$
18. $\frac{1}{8} \times \frac{1}{8} =$

Divide the following fractions and reduce the answer to the lowest fractional term.

19. $\frac{1}{2} \div \frac{3}{4} =$

20. $\frac{1}{3} \div \frac{7}{8} =$

21. $\frac{1}{5} \div \frac{1}{2} =$

22. $\frac{4}{8} \div \frac{2}{3} =$

23. $\frac{1}{3} \div \frac{2}{3} =$

24. $\frac{3}{4} \div \frac{7}{8} =$

Multiply the following decimals.

25. $\begin{array}{r} 6.45 \\ \times 1.36 \end{array}$

26. $\begin{array}{r} 3.14 \\ \times 2.20 \end{array}$

27. $\begin{array}{r} 16.286 \\ \times 0.125 \end{array}$

28. $\begin{array}{r} 1.2 \\ \times 0.5 \end{array}$

29. $\begin{array}{r} 7.68 \\ \times 0.05 \end{array}$

30. $\begin{array}{r} 0.55 \\ \times 0.75 \end{array}$

Divide the following decimals.

31. $0.5\overline{)1.25}$

32. $0.20\overline{)40.80}$

33. $0.125\overline{)0.25}$

34. $0.75\overline{)0.125}$

(Practice Problems continues on page 20)

35. $0.5\overline{)7.30}$

36. $0.3\overline{)0.525}$

Convert the following fractions to decimals and round to the tenth.

37. $\frac{1}{2} =$

38. $\frac{1}{3} =$

39. $\frac{3}{4} =$

40. $\frac{2}{3} =$

41. $\frac{1}{8} =$

42. $\frac{7}{8} =$

Chapter 1 Post-Test Arithmetic Review

Name _____ **Date** _____

Converting Between Arabic Numbers and Roman Numerals

1. 4 = _____
2. IX = _____

Multiplying and Dividing Fractions

3. $\frac{2}{4} \times \frac{1}{2} =$ _____
4. $\frac{5}{6} \times \frac{3}{4} =$ _____
5. $\frac{1}{6} \div \frac{1}{3} =$ _____
6. $\frac{1}{150} \div \frac{1}{2} =$ _____

Converting Fractions to Decimals

7. $\frac{1}{2} =$ _____
8. $\frac{3}{4} =$ _____
9. $\frac{2}{3} =$ _____

Multiplying and Dividing Decimals

10. $0.25 \times 1.25 =$ _____
11. $0.125 \div 0.25 =$ _____
12. $1.5 \times 0.25 =$ _____
13. $0.125 \div 0.5 =$ _____