Increase your confidence and aptitude in dosage calculations with the best-selling ratio and proportion book on the market!

Learn from the master, Anna Curren, who has successfully taught dosage calculations to thousands of students. This new edition of Math for Meds includes full-color drug labels and syringes throughout, which are tied to questions that test your understanding and mastery of the concepts. With the goal of helping you become a safe and effective practitioner, Math for Meds walks you through basic and advanced calculations in detail, including intravenous and pediatric calculations.

FEATURES:
- A building block approach moves from basic to more difficult concepts; concise explanations keep you focused on need-to-know information
- Emphasizes the basic content of medication dosages by instructing in dosage labels, syringe calibrations, metric, unit, and mEq measures, and calculation of most common dosages
- Covers advanced calculations for IV, heparin, critical care, and pediatric dosages
- New chapter 7: Safe Medication Administration, highlights the newest regulations on medication abbreviations, the rights of medication administration, reducing dosage errors, and safe medication practices
- New chapter 13: Dimensional Analysis/Units Conversion, helps you understand alternate methods to arrive at solutions to dosage questions
- Hundreds of examples, practice problems, and Summary Self-Test questions ensure complete mastery of dosage calculations
- Exciting in-book CD with tutorials, problem sets, and self-tests so you can quiz yourself in an interactive environment
- New online resources such as WebTutor courses (WebCT and Blackboard) and an online companion include questions, links, quizzes, flash cards, and more!

Also Available from Delmar, Cengage Learning:
- 3-2-1 Calc!, Comprehensive Dosage Calculations Online
- Anna M. Curren and Gloria D. Pickar
- 1-4018-3326-8 (online individual purchase)
- 1-4180-6671-0 (institutional purchase)
- George R. Spratto and Adrienne L. Woods
- 1-4283-6106-5

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Visit our corporate website at cengage.com
### Celsius and Fahrenheit Temperature Equivalents

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- To convert °C to °F, multiply by 1.8 and add 32.
- To convert °F to °C, subtract 32 and divide by 1.8.

### Comparison of Standard and International/Military Time

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### Drug Administration Abbreviations

In recent years, abbreviations have been identified as a major cause of medication errors. At the present time, only those listed have not been targeted for deletion. Read Chapter 7 for additional details.

- **a.c.** before meals
- **ad lib** as desired
- **b.i.d.** two times a day
- **cap** capsule
- **elix.** elixir
- **ext** extract
- **IM** intramuscular
- **IV** intravenous
- **nightly** every night at bedtime
- **NS (N/S)** normal saline
- **OD** right eye
- **OS** left eye
- **OU** both eyes
- **p.c.** after meals
- **per** by
- **PO; orally** by mouth
- **p.r.n.** when necessary/required
- **soln.** solution
- **stat.** at once; immediately
- **subcut.** subcutaneous
- **supp.** suppository
- **susp.** suspension
- **syp.** syrup
- **tab.** tablet
- **tr. or tinct.** tincture
- **ung** ointment
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Math for Meds is your partner for success in the dosage calculations arena. With a long and distinguished history of positive instruction with more than a million users, its fully self-instructional approach has fostered achievement and confidence for over three decades as the ideal choice for both learners and instructors.

A large part of the credit for this successful journey lies in the fact that Math for Meds, tenth edition, has kept up with the times, while never losing sight of the beginning students it was designed to teach. Math for Meds is the only calculations text that is completely focused to teach from simple to complex. It eliminates the unnecessary, keeps instruction consistently geared toward clinical realities, and offers a solid and seamless learning process from day one until program completion.

ORGANIZATION

Math for Meds allows for self-paced study, progressing from basic to more complex information. All learners are invited to complete the Refresher Math Pretest on page xvii to determine their competence in basic math skills. Section 1, Refresher Math, is also recommended for all learners, as the numerous shortcuts and memory cues included in this section are used in examples throughout the text. Calculators are used routinely in clinical facilities and on the NCLEX exam, and their use is encouraged in this text. Bear in mind that fractional variations in answers due to rounding of numbers may occur and should be considered correct.

Once the fundamental skills are mastered, the learner will move on to the basics needed for calculating dosages and administering medications; metric system units and milliequivalent dosages; reading dosage labels and syringe calibrations; and working with reconstituted drugs and insulin. Hundreds of sample dosage problems will cement these learnings.

With these basic skills solidified, students are prepared for the advanced calculations presented in the second half of the text, where the content has been expanded to include instruction in all three calculation methods: ratio and proportion, dimensional analysis, and the formula method. Body weight and body surface area calculations, as well as intravenous and heparin calculations, are thoroughly covered and tested. Pediatric medication calculations round out the learner’s education.

FEATURES

Math for Meds offers examples and review tests throughout to aid comprehension, and running answers allow the learner to receive immediate feedback on deficits and strengths. A key icon is used throughout the chapters to allow learners to easily identify important information. The most up-to-date equipment and safety devices are depicted in color, and real, full-color drug labels and syringes are included with explanations and dosage problems. With the goal of helping students become safe and
effective practitioners, *Math for Meds* works through basic and advanced calculations in detail, including intravenous and pediatric calculations, so that students are fully equipped to safely prepare and administer medications in a clinical setting.

**NEW TO THIS EDITION**

- All new syringe photos with enhanced readability and clarity make medication administration experience mirror reality.
- Many new, current drug labels reflect the most up-to-date information on the market.
- New Chapter 7: Safe Medication Administration highlights the newest regulations on medication abbreviations, the six rights of medication administration, reducing dosage errors, and safe medication practices.
- New Chapter 13: Dimensional Analysis/Units Conversion presents this alternate method to dosage calculations for the first time.
- An exciting in-book CD with tutorials, problems, and self-tests allows study and testing in an interactive environment.
- New online WebTutor Advantage courses (WebCT and Blackboard) include questions, links, quizzes, flash cards, and other valuable resources, all designed to enhance classroom learning.
- A new Electronic Classroom Manager (ECM) with teaching aids and calculation solutions is now offered for instructors.

**ANCILLARY SUPPORT MATERIALS**

This new edition of *Math for Meds* offers a wealth of electronic resources to support both students and instructors. These interactive learning partners will guide, test, challenge, and help increase proficiency in dosage calculations.

**Tutorial Software**

Engaging Student Practice Software is available free to each user of *Math for Meds*. The CD-ROM packaged within the book features:

- A user-friendly menu structure to immediately access the program's items.
- Tutorials, problems, and a self-test for each chapter in the text.
- Interactive exercises that allow calculation of dosages and measurement of dosages calculated on hypodermic syringes.
- A drop-down calculator available at a click of a button, as used on the NCLEX-RN examination.

**Electronic Classroom Manager (ECM) (ISBN 1-4283-1096-7)**

An innovative new Electronic Classroom Manager (ECM) offers a wealth of useful tools to facilitate teaching and support of goals for student success. The following components are included in this invaluable digital resource, which is free to adopters of *Math for Meds*:

- PowerPoint slides facilitate classroom instruction by offering ready-made presentation outlines, tools, and procedures.
- A Computerized Test Bank offers over 500 new questions designed for testing and evaluation.
An Instructor’s Manual includes step-by-step solutions to all problems and self-tests included in the text.

An Image Library of dozens of figures, labels, and syringes from the text facilitates searching for, copying, and saving images into Microsoft PowerPoint presentations or other learning tools.

WebTutor Advantage on WebCT (ISBN 14283-10975) and Blackboard (ISBN 14283-10983)

WebTutors (both WebCT and Blackboard formats) accompany this new edition of Math for Meds. These online resources offer must-have classroom management tools, such as chats and calendars, as well as additional content resources, including class notes, videos, student quizzes, frequently asked questions, a glossary, and more.

Online Companion (ISBN 1-4283-1099-1)

An exciting, new, robust online companion is available to adopters of this textbook. This valuable resource includes instructor support materials, exercises, and more. Contact your local sales representative for the access code to the online companion.
INTRODUCTION FOR THE LEARNER

Welcome to what we anticipate will be one of the more enjoyable texts in your bookbag. *Math for Meds* is about to reassure you that math is nothing to be afraid of, and that on completion of your instruction you will have the calculation skills you need to practice safely in your profession. You don’t have to be a math expert to be successful in dosage calculations; what you do need is a desire for accuracy and a motivation to learn. If you have not used your math skills for a number of years, *Section 1, Refresher Math*, will quickly bring you up to date. *Math for Meds* is fully self-instructional and lets you move at your own pace through the content. Hundreds of examples and problems will keep your learning on track. Here are some tips to help you to get started.

1. Gather a calculator, pencil or pen, and plenty of scratch paper.

2. Start by completing the Refresher Math Pretest on page xvii. This will alert you to those areas in *Section 1, Refresher Math*, that you will need to pay particular attention to. Some of the items in the Pretest and Refresher Math section were designed to be completed without using a calculator, but the choice is entirely yours; when you need a calculator, use one. You must remember, however, that calculator settings vary. All answers in this text were checked with a calculator set to hundredths. If you use one with a different setting, you may experience small differences in your answers in the tenths or hundredths.

3. Record the answers to calculations on the scratch paper as well as in your text. This makes checking your answers against those we provide much easier.

4. As you work your way through the chapters, do exactly as you are instructed to do. Programmed learning proceeds in small steps, and jumping ahead may cause confusion. All chapters are designed to let you move at your own speed, and if you already know some of the basics, you will move through them more quickly than you can imagine.

5. Once you have completed your instruction, keep *Math for Meds* in your personal library. As you move to different clinical areas during your career, you will encounter different types of calculations. A quick refresher with *Math for Meds* will be invaluable when that occurs.
Welcome to the exciting tenth edition of *Math for Meds*. Whether you are a seasoned user of this text or are becoming acquainted with it for the first time, we would like to share a few ideas on how to most effectively incorporate this bestselling text into your curriculum. *Math for Meds* is designed to be used starting early in the students’ beginning semester. Many instructors assign the entire Section 1, Refresher Math, to be completed before the semester starts, and test on it within the first two weeks. Or, chapters can be assigned on a weekly basis at a pace fitting your students’ profiles.

Students have many pressures on their time, and experience has shown that they learn best when their progress is routinely both encouraged and monitored. A short weekly test of about ten questions on the content assigned is the ideal way to do this. If a student struggles with the first test, provide a makeup opportunity. If a second test is unsuccessful, you will need to delve more deeply to determine the exact problem and help the student establish a study plan. The content in Section 1 is ideally suited to bring students up to the level of math skills required for success in dosage calculations.

Because testing and reinforcement are such vital components of learner success, encourage learners to use the CD located in the back of the textbook. Each chapter in this valuable electronic resource opens with a short tutorial designed to reinforce text concepts. Interactive problems and self-tests for each chapter reinforce accuracy and offer feedback as the student works at an individual pace. Another valuable electronic resource for learners is the WebCT and Blackboard courses accompanying *Math for Meds*; these offer class notes, frequently asked questions, additional quizzes, and much more, all of which offer excellent reinforcement of concepts presented in the text.

As an instructor, you will also have access to valuable electronic resources that will enhance your students’ success. PowerPoint presentations, calculation solutions, images, and a test bank are all included on our Electronic Classroom Manager (ECM), with the goal of facilitating classroom preparation and allowing you to focus as much time as possible on student interaction and competence. With *Math for Meds*, both you and your students are prepared for success!
USING THE LEARNING PACKAGE

A Key icon designates important reminders to help with calculations and to highlight important safety considerations. As you study for your exams, locate these Keys and make sure you know and understand them. Consider making flash cards of the Keys to be certain you know them.

Example icons walk you through each concept in a step-by-step manner, showing the calculation and mathematical processes. Focus on these areas to be sure you understand how to do each different type of calculation.

Problems are sprinkled throughout each chapter. This is your opportunity to put your skills to the test, to identify your areas of strength, and to also acknowledge those areas where you need additional study. Answers to all problems are printed in the accompanying shaded box. Double-check your calculations if you have difficulty, or talk to your instructor for additional help.

Actual full-color labels are used to support the problems and examples. Challenge yourself to read the labels carefully and accurately; are you able to understand the quantity, strength, form, dosing and administration guidelines for every label you encounter?
New photos of syringes are depicted in actual size so that you can gain confidence in perfecting the real-life skill of accurately reading and interpreting syringe calibrations and medication levels.

Summary Self-Tests round out each chapter. Complete these as you finish studying the material, identify areas where you need to focus, and review the content again until you are confident in your calculating ability. Many of these tests include combined label and syringe questions, where you must calculate a dosage and then measure the dosage on a syringe. This is an excellent tool to test how well you apply your knowledge.

Online Resources are available at your fingertips. Visit the online companion and web tutor components for valuable course content, exercises, tutorials, class notes, glossaries, and more.
The Student Study Software CD-ROM is a built-in learning tutor. After studying each chapter, be sure to also work with the in-book CD. This valuable resource will help cement understanding of key rules and math explanations, and continuously expand skills and confidence in performing dosage calculations.

Main Menu
The main menu is organized by units and chapters that correspond to the units and chapters in the core book.

- **Tutorials** open each chapter. These provide a quick review of the text content to ensure complete understanding of the material in these first few screens before moving on to the problems and self-tests.

Problems
Each chapter includes practice problems that incorporate labels and syringes for the most realistic and challenging practice experience. Practice problems allow two tries to obtain the correct answer. If the correct answer is not obtained on the second try, the answer and solution will appear on the screen.

Scoring
Problem answers are scored for assessment of strengths and weaknesses and to determine which topics need further study.

Interactive Syringes
Some questions include the use of interactive syringes. The computer mouse can be used to click and drag the syringe plunger to the correct syringe measurement. All syringes are duplicated in actual size.

Summary Self-Tests
Comprehensive tests follow each chapter, providing a single opportunity to correctly answer to simulate a true testing environment. Answers and solutions are provided.
Dear Educators:

The first edition of Math for Meds was welcomed as the text that “eliminates the unnecessary.” It did just that, and it introduced the **clinically focused approach** to dosage calculation instruction that is now the standard in the field. The first edition had only 56 pages. Adoption and support from appreciative educators made Math for Meds the leading text on dosage calculations continent-wide, a distinction it still holds.

The explosion of relevant information in subsequent years makes Math for Meds’ original 56-page count seem like a myth. But more is not necessarily better. In fact, “more” has reached a competitive stage where the slogan “eliminates the unnecessary” is again a critical issue in dosage calculations instruction.

Math for Meds has never lost sight of the beginning students it is designed to teach. What is really needed is a clear presentation of the solid basics that students can build on throughout their programs and in their clinical experience. The size and depth of Math for Meds, tenth edition, makes it the perfect vehicle for accomplishing this.

Math for Meds, tenth edition, is the only text that teaches first to the over 90% of average dosages that the beginning student will learn from. It THEN introduces the advanced calculations that require the use of ratio and proportion, dimensional analysis, or the formula method. All three calculation methods are presented in the new Math for Meds, tenth edition.

Refresher math is limited to the essentials needed. Metric and other dosage measures are succinct yet complete; hundreds of dosage label and syringe calibration photos are incorporated into clinically realistic calculations. The more advanced calculations are properly positioned to build on basic calculation skills as instruction moves to its logical completion.

The format and content of Math for Meds is not an accident. It is the result of the combined close working relationship between the author and educators over more than a 30-year period. More than a million students can attest to its effectiveness.

I thank you for choosing Math for Meds, tenth edition, and invite you to evaluate its content and clarity. Suggestions from educators continue to be my most important revision tool; I solicit ongoing input from both educators and learners, sent care of Delmar Cengage Learning, in continuing to make future editions even more fitting to your needs.

*Anna M. Curren*
REFRESHER MATH PRETEST

If you can complete the Pretest with 100% accuracy, you are off to an exceptional start. However, don’t be alarmed if you make some errors because the Refresher Math section that follows is designed to bring your math skills up-to-date. Regardless of your proficiency, it’s important that you complete the entire Refresher Math Section. It includes memory cues and shortcuts for simplifying and solving many of the clinical calculations that are included in the entire text, and you will need to be familiar with these.

Identify the decimal fraction with the greatest value in each set.

1. a) 4.4  b) 2.85  c) 5.3
2. a) 6.3  b) 5.73  c) 4.4
3. a) 0.18  b) 0.62  c) 0.35
4. a) 0.2  b) 0.125  c) 0.3
5. a) 0.15  b) 0.11  c) 0.14
6. a) 4.27  b) 4.31  c) 4.09

Add these decimals.

7. 0.2 + 2.23 =
8. 1.5 + 0.07 =
9. 6.45 + 12.1 + 9.54 =
10. 0.35 + 8.37 + 5.15 =

Subtract these decimals.

11. 3.1 - 0.67 =
12. 12.41 - 2.11 =
13. 2.235 - 0.094 =
14. 4.65 - 0.7 =

15. If tablets with a strength of 0.2 mg are available and 0.6 mg is ordered, how many tablets must you give?
16. If tablets are labeled 0.8 mg and 0.4 mg is ordered, how many tablets must you give?
17. If the available tablets have a strength of 1.25 mg and 2.5 mg is ordered, how many tablets must you give?
18. If 0.125 mg is ordered and the tablets available are labeled 0.25 mg, how many tablets must you give?

Express these to the nearest tenth.

19. 2.17 =
20. 0.15 =
21. 3.77 =
22. 4.62 =
23. 11.74 =
24. 5.26 =

Express these to the nearest hundredth.

25. 1.357 =
26. 7.413 =
27. 10.105 =

Multiply these decimals. Express your answers to the nearest tenth.

31. 0.7 × 1.2 =
32. 1.8 × 2.6 =
33. 5.1 × 0.25 × 1.1 =
34. 3.3 × 3.75 =

Divide these fractions. Express your answers to the nearest hundredth.

35. 16.3 ÷ 3.2 =
36. 15.1 ÷ 1.1 =
37. 2 ÷ 0.75 =
38. 4.17 ÷ 2.7 =

39. Define “numerator.”

40. Define “denominator.”

41. Define “greatest common denominator.”

Solve these equations. Express your answers to the nearest tenth.

42. \(\frac{1}{4} \times \frac{2}{5} = \)
43. \(\frac{240}{170} \times \frac{135}{300} = \)
44. \(\frac{0.2}{1.75} \times \frac{1.5}{0.2} = \)
45. \(\frac{2.1}{3.6} \times \frac{1.7}{1.3} = \)
46. \(\frac{0.26}{0.2} \times \frac{3.3}{1.2} = \)
47. \(\frac{750}{1} \times \frac{300}{50} \times \frac{2}{2} = \)
48. \(\frac{50}{1} \times \frac{60}{240} \times \frac{1}{900} \times \frac{400}{1} = \)
49. \(\frac{35,000}{750} \times \frac{35}{1} = \)
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<tr>
<td>30</td>
<td>The answer obtained from the multiplication of two or more numbers</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>0.8</td>
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<tr>
<td>32</td>
<td>4.7</td>
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<tr>
<td>33</td>
<td>1.4</td>
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<tr>
<td>34</td>
<td>12.4</td>
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<tr>
<td>35</td>
<td>5.09</td>
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<tr>
<td>36</td>
<td>13.73</td>
<td></td>
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<tr>
<td>37</td>
<td>2.67</td>
<td></td>
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<tr>
<td>38</td>
<td>1.54</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>The top number in a common fraction</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>The bottom number in a common fraction</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>The greatest number that can be divided into two numbers to reduce them to their lowest terms (values)</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>0.6</td>
<td></td>
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<tr>
<td>44</td>
<td>0.9</td>
<td></td>
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<tr>
<td>45</td>
<td>0.8</td>
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<tr>
<td>48</td>
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<td></td>
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<tr>
<td>50</td>
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CHAPTER 1
Relative Value, Addition and Subtraction of Decimals / 2

CHAPTER 2
Multiplication and Division of Decimals / 11

CHAPTER 3
Solving Common Fraction Equations / 22
RELATIVE VALUE, ADDITION AND SUBTRACTION OF DECIMALS

In the course of administering medications, you will be dealing with decimal fraction dosages on a daily basis. The first two chapters of this text provide a complete refresher on everything you need to know about decimals, including safety measures when you do calculations both manually and with a calculator. We'll start with a review of the range of decimal values you will see in dosages. This will enable you to recognize which of two or more numbers has the greater (or lesser) value—a skill you will use constantly in your professional career.

RELATIVE VALUE OF DECIMALS

The most helpful fact to remember about decimals is that our monetary system of dollars and cents is a decimal system. The whole numbers in dosages have the same relative value as dollars, and decimal fractions have the same value as cents: the greater the number, the greater the value. If you keep this in mind, you will have already learned the most important safety measure of dealing with decimals in dosages.

The range of drug dosages, which includes decimal fractions, stretches from millions on the whole number side to thousandths on the decimal side. Refer to the decimal scale in Figure 1-1, and locate the decimal point, which is slightly to the right on this scale. Notice the whole numbers on the left of the scale, which rise increasingly in value from ones (units) to millions, which is the largest whole number drug dosage in current use.

**Objectives**

The learner will:

1. identify the relative value of decimals.
2. add decimals.
3. subtract decimals.

**Prerequisite**

Recognize the abbreviations mg, for milligram, and g, for gram, as drug measures.
The first key point in determining the relative value of decimals is the presence of whole numbers. The greater the whole number, the greater the value.

**EXAMPLE 1**

10.1 is greater than 9.15

**EXAMPLE 2**

3.2 is greater than 2.99

**EXAMPLE 3**

7.01 is greater than 6.99

### Problems 1.1

Choose the greatest value in each set.

1. a) 3.5  
   b) 2.7  
   c) 4.2

2. a) 6.15  
   b) 5.95  
   c) 4.54

3. a) 12.02  
   b) 10.19  
   c) 11.04

4. a) 2.5  
   b) 1.75  
   c) 0.75

5. a) 4.3  
   b) 2.75  
   c) 5.1

6. a) 6.15  
   b) 7.4  
   c) 5.95

7. a) 7.25  
   b) 8.1  
   c) 9.37

8. a) 4.25  
   b) 5.1  
   c) 3.75

9. a) 9.4  
   b) 8.75  
   c) 7.4

10. a) 5.1  
    b) 6.33  
    c) 4.2

**Answers**  
1. c   2. a   3. a   4. a   5. c   6. b   7. c   8. b   9. a   10. b

If, however, the whole numbers are the same—for example, 10.2 and 10.7—or there are no whole numbers—for example, 0.25 and 0.35—then the fraction will determine the relative value. Let’s take a closer look at the fractional side of the scale (refer to Figure 1-2).

**Figure 1-2**
It is necessary to consider only three figures after the decimal point on the fractional side because drug dosages measured as decimal fractions do not contain more than three digits; for example, 0.125 mg. Notice that a zero is used to replace the whole number in this decimal fraction and in all dosages that do not contain a whole number.

If a decimal fraction is not preceded by a whole number, a zero is used in front of the decimal point to emphasize that the number is a fraction.

**EXAMPLE**

0.125 0.1 0.45

Look again at Figure 1-2. The numbers to the right of the decimal point represent tenths, hundredths, and thousandths, in that order. When you see a decimal fraction in which the whole numbers are the same, or there are no whole numbers, stop and look at the number representing tenths.

The fraction with the greater number representing tenths has the greater value.

**EXAMPLE 1**

0.3 is greater than 0.27

**EXAMPLE 2**

0.4 is greater than 0.29

**EXAMPLE 3**

1.2 is greater than 1.19

**EXAMPLE 4**

3.5 is greater than 3.2

**Problems 1.2**

Choose the greatest value in each set.

1. a) 0.4  b) 0.2  c) 0.5
2. a) 2.73  b) 2.61  c) 2.87
3. a) 0.19  b) 0.61  c) 0.34
4. a) 3.5  b) 3.75  c) 3.25
5. a) 0.3  b) 0.25  c) 0.4
6. a) 1.35  b) 1.29  c) 1.4
7. a) 2.5  b) 2.7  c) 2.35
8. a) 4.51  b) 4.75  c) 4.8
9. a) 0.8  b) 0.3  c) 0.4
10. a) 2.1  b) 2.05  c) 2.15

**Answers**

1. c  2. c  3. b  4. b  5. c  6. c  7. b  8. c  9. a  10. c
Chapter 1  Relative Value, Addition and Subtraction of Decimals  

If in decimal fractions the numbers representing the tenths are identical—for example, 0.25 and 0.27—then the number representing the hundredths will determine the relative value.

When the tenths are identical, the fraction with the greater number representing hundredths will have the greater value.

**EXAMPLE 1** 0.27 is greater than 0.25

**EXAMPLE 2** 0.15 is greater than 0.1 (0.1 is the same as 0.10)

Extra zeros on the end of decimal fractions are omitted in drug dosages because they can easily be misread and lead to errors.

**EXAMPLE 3** 2.25 is greater than 2.2 (same as 2.20)

**EXAMPLE 4** 9.77 is greater than 9.7 (same as 9.70)

**Problems 1.3**

Choose the greatest value in each set.

1. a) 0.12  
   b) 0.15  
   c) 0.17  

2. a) 1.2  
   b) 1.24  
   c) 1.23  

3. a) 0.37  
   b) 0.3  
   c) 0.36  

4. a) 3.27  
   b) 3.25  
   c) 3.21  

5. a) 0.16  
   b) 0.11  
   c) 0.19  

6. a) 4.23  
   b) 4.2  
   c) 4.09  

7. a) 3.27  
   b) 3.21  
   c) 3.29  

8. a) 2.75  
   b) 2.73  
   c) 2.78  

9. a) 0.31  
   b) 0.37  
   c) 0.33  

10. a) 0.43  
    b) 0.45  
    c) 0.44  

   **Answers** 1. c  
   2. b  
   3. a  
   4. a  
   5. c  
   6. a  
   7. c  
   8. c  
   9. b  
   10. b

**Problems 1.4**

Which fraction has the greater value?

a) 0.125  
   b) 0.25
If you chose 0.125, you have just made a serious drug dosage error. Look again at the numbers representing the tenths, and you will see that 0.25 is greater than 0.125. Remember that extra zeros are omitted in decimal fraction dosages because they can lead to errors. In this fraction, 0.25 is the same as 0.250, which is exactly double the value of 0.125. This dosage could also easily be misread as 25 and 125, which would result in five times the dosage ordered being administered. **Check the tenths carefully, regardless of the total of numbers after the decimal point.**

**EXAMPLE 1**
0.15 (same as 0.150) is greater than 0.125

**EXAMPLE 2**
0.3 (same as 0.30) is greater than 0.15

**EXAMPLE 3**
0.75 (same as 0.750) is greater than 0.325

**EXAMPLE 4**
0.8 (same as 0.80) is greater than 0.16

The number of figures on the right of the decimal point is not an indication of relative value. Always look at the figure representing the tenths first, and if these are identical, then check the hundredths to determine which has the greater value.

This completes your introduction to the relative value of decimals. The key points just reviewed will cover all situations in dosage calculations where you will have to recognize greater and lesser values. You are now ready to test yourself more extensively on this information.

**Problems 1.5**

Choose the greatest value in each set.

1. a) 0.24   b) 0.5   c) 0.125
2. a) 0.4   b) 0.45   c) 0.5
3. a) 7.5   b) 6.25   c) 4.75
4. a) 0.3   b) 0.25   c) 0.35
5. a) 1.125   b) 1.75   c) 1.5
6. a) 4.5   b) 4.75   c) 4.25
7. a) 0.1   b) 0.01   c) 0.04
8. a) 5.75   b) 6.25   c) 6.5
9. a) 0.6   b) 0.16   c) 0.06
10. a) 3.55   b) 2.95   c) 3.7

**Answers**
1. b   2. c   3. a   4. c   5. b   6. b   7. a   8. c   9. a   10. c
Chapter 1  Relative Value, Addition and Subtraction of Decimals

**ADDITION AND SUBTRACTION OF DECIMALS**

Most addition and subtraction of decimals should be done with a calculator, but, on occasion, time can be saved by doing simple calculations without one. Let's start by looking at a few key points that will make manual solution safer.

When you write the numbers down, line up the decimal points.

**EXAMPLE**

To add 0.25 and 0.27

\[
\begin{array}{c}
0.25 \\
+0.27 \text{ is safe}
\end{array}
\]

0.27 may be unsafe; it could lead to errors.

Always add or subtract from right to left.

If you decide to write the numbers down, don't confuse yourself by trying to “eyeball” the answer. Also, write any numbers carried or rewrite those reduced by borrowing if you find this helpful.

**EXAMPLE 1**

When adding 0.25 and 0.27

\[
\begin{array}{c}
1 \\
0.25 \\
+0.27 \text{ add the 5 and 7 first, then the 2, 2, and the 1 you carried. Work from right to left.}
\end{array}
\]

**EXAMPLE 2**

When subtracting 0.63 from 0.71

\[
\begin{array}{c}
61 \\
0.71 \text{ borrow 1 from 7 and rewrite as 6} \\
-0.63 \text{ write the borrowed 1. Subtract 3 from 11.} \\
0.08 \text{ subtract 6 from 6. Work from right to left.}
\end{array}
\]

Add zeros as necessary to make the fractions of equal length.

This does not alter the value of the fractions, and it helps prevent confusion and mistakes.

**EXAMPLE**

When subtracting 0.125 from 0.25

\[
\begin{array}{c}
0.25 \\
0.125 \text{ becomes} \\
0.08 \text{ Answer } = 0.125
\end{array}
\]

If you follow these simple rules and make them a habit, you will automatically reduce calculation errors. The problems on the following page will give you an excellent opportunity to practice.
Problems 1.6

Add decimals.

1. \(0.25 + 0.55 = \) 
6. \(3.75 + 1.05 = \)
2. \(0.1 + 2.25 = \) 
7. \(6.35 + 2.05 = \)
3. \(1.74 + 0.76 = \) 
8. \(5.57 + 4.03 = \)
4. \(1.4 + 0.02 = \) 
9. \(0.33 + 2.42 = \)
5. \(2.3 + 1.45 = \) 
10. \(1.44 + 3.06 = \)

Subtract decimals.

11. \(1.25 - 1.125 = \) 
16. \(7.33 - 4.03 = \)
12. \(3.25 - 0.65 = \) 
17. \(4.25 - 1.75 = \)
13. \(2.3 - 1.45 = \) 
18. \(0.07 - 0.035 = \)
14. \(0.02 - 0.01 = \) 
19. \(0.235 - 0.12 = \)
15. \(5.5 - 2.5 = \) 
20. \(5.75 - 0.95 = \)

Answers 1. 0.8 2. 2.35 3. 2.5 4. 1.42 5. 3.75 6. 4.8 7. 8.4 8. 9.6 9. 2.75 10. 4.5 11. 0.125 12. 2.6 13. 0.85 14. 0.01 15. 3 16. 3.3 17. 2.5 18. 0.035 19. 0.115 20. 4.8

Note: If you did not add a zero before the decimal point in answers that do not contain a whole number or failed to eliminate unnecessary zeros from the end of decimal fractions, your answers are incorrect.

Summary

This concludes the refresher on relative value, addition and subtraction of simple decimals. The important points to remember from this chapter are:

- If a decimal fraction contains a whole number, the value of the whole number is the first determiner of relative value.
- If a fraction does not include a whole number, a zero is placed in front of the decimal point to emphasize that it is a fractional dosage.
- If there is no whole number or if the whole numbers are the same, the number representing the tenths in the decimal fraction will be the next determiner of relative value.
- If the tenths in decimal fractions are identical, the number representing hundredths will determine relative value.
- When manually adding or subtracting decimal fractions, first line up the decimal points, then add or subtract from right to left.
- Extra zeros on the end of decimal fractions can be a source of error and are routinely eliminated.
Summary Self-Test

Choose the decimal with the greatest value.

1. a) 2.45  
   b) 2.57  
   c) 2.19

2. a) 3.07  
   b) 3.17  
   c) 3.71

3. a) 0.12  
   b) 0.02  
   c) 0.01

4. a) 5.31  
   b) 5.35  
   c) 6.01

5. a) 4.5  
   b) 4.51  
   c) 4.15

6. a) 0.015  
   b) 0.15  
   c) 0.1

7. a) 1.3  
   b) 1.25  
   c) 1.35

8. a) 0.1  
   b) 0.2  
   c) 0.25

9. a) 0.125  
   b) 0.1  
   c) 0.05

10. a) 13.7  
    b) 13.5  
    c) 13.25

11. If you have medication tablets whose strength is 0.1 mg and you must give 0.3 mg, you will need
    a) 1 tablet.  
    b) less than 1 tablet.  
    c) more than 1 tablet.

12. If you have tablets with a strength of 0.25 mg and you must give 0.125 mg, you will need
    a) 1 tablet.  
    b) less than 1 tablet.  
    c) more than 1 tablet.

13. If you have an order to give a dosage of 7.5 mg and the tablets have a strength of 3.75 mg, you will need
    a) 1 tablet.  
    b) less than 1 tablet.  
    c) more than 1 tablet.

14. If the order is to give 0.5 mg and the tablet strength is 0.5 mg, you will give
    a) 1 tablet.  
    b) less than 1 tablet.  
    c) more than 1 tablet.

15. The order is to give 0.5 mg and the tablets have a strength of 0.25 mg. You must give
    a) 1 tablet.  
    b) less than 1 tablet.  
    c) more than 1 tablet.

Add the decimals manually.

16. 1.31 + 0.4  =  
17. 0.15 + 0.25 =  
18. 2.5 + 0.75 =  
19. 3.2 + 2.17 =  
20. 1.3 + 1.04 =  
21. 4.7 + 3.03 =  
22. 0.5 + 0.5 =  
23. 5.4 + 2.6 =  

24. You have just given two tablets with a dosage strength of 3.5 mg each. What was the total dosage administered? 

25. You are to give your patient one tablet labeled 0.5 mg and one labeled 0.25 mg. What is the total dosage of these two tablets? 

26. If you give two tablets labeled 0.02 mg, what total dosage will you administer?
27. You are to give one tablet labeled 0.8 mg and two tablets labeled 0.4 mg. What is the total dosage? __________

28. You have two tablets: one is labeled 0.15 mg and the other 0.3 mg. What is the total dosage of these two tablets? __________

Subtract the decimals manually.

29. $4.32 - 3.1 = \underline{\hspace{2cm}}$ \hspace{2cm} 33. $1.3 - 0.02 = \underline{\hspace{2cm}}$

30. $2.1 - 1.91 = \underline{\hspace{2cm}}$ \hspace{2cm} 34. $0.2 - 0.07 = \underline{\hspace{2cm}}$

31. $3.73 - 1.93 = \underline{\hspace{2cm}}$ \hspace{2cm} 35. $3.95 - 0.35 = \underline{\hspace{2cm}}$

32. $5.75 - 4.05 = \underline{\hspace{2cm}}$ \hspace{2cm} 36. $1.9 - 0.08 = \underline{\hspace{2cm}}$

37. Your patient is to receive a dosage of 7.5 mg and you have only one tablet labeled 3.75 mg. How many more milligrams must you give? __________

38. You have a tablet labeled 0.02 mg and your patient is to receive 0.06 mg. How many more milligrams must you give? __________

39. The tablet available is labeled 0.5 mg, but you must give a dosage of 1.5 mg. How many more milligrams will you need to obtain the correct dosage? __________

40. Your patient is to receive a dosage of 1.2 mg and you have one tablet labeled 0.6 mg. What additional dosage in milligrams will you need? __________

41. You must give your patient a dosage of 2.2 mg, but you have only two tablets labeled 0.55 mg. What additional dosage in milligrams will you need? __________

Determine how many tablets will be needed to give the dosages.

42. Tablets are labeled 0.01 mg. You must give 0.02 mg. __________

43. Tablets are labeled 2.5 mg. You must give 5 mg. __________

44. Tablets are labeled 0.25 mg. Give 0.125 mg. __________

45. Tablets are 0.5 mg. Give 1.5 mg. __________

46. A dosage of 1.8 mg is ordered. Tablets are 0.6 mg. __________

47. Tablets available are 0.04 mg. You are to give 0.02 mg. __________

48. The dosage ordered is 3.5 mg. The tablets available are 1.75 mg. __________

49. Prepare a dosage of 3.2 mg using tablets with a strength of 1.6 mg. __________

50. You have tablets labeled 0.25 mg and a dosage of 0.375 mg is ordered. __________

Answers

1. b
2. c
3. a
4. c
5. b
6. b
7. c
8. c
9. a
10. a
11. c
12. b
13. c
14. a
15. c
16. 1.71
17. 0.4
18. 3.25
19. 5.37
20. 2.34
21. 7.73
22. 1
23. 8
24. 7 mg
25. 0.75 mg
26. 0.04 mg
27. 1.6 mg
28. 0.45 mg
29. 1.22
30. 0.19
31. 1.8
32. 1.7
33. 1.28
34. 0.13
35. 3.6
36. 1.82
37. 3.75 mg
38. 0.04 mg
39. 1 mg
40. 0.6 mg
41. 1.1 mg
42. 2 tab
43. 2 tab
44. 1½ tab
45. 3 tab
46. 3 tab
47. ½ tab
48. 2 tab
49. 2 tab
50. 1½ tab

Note: If you did not add a zero before the decimal point in answers that did not contain a whole number or failed to eliminate unnecessary zeros from the end of decimal fractions, your answers are incorrect.
Multiplication and division are integral parts of dosage calculations. As is the case with addition and subtraction, some multiplication and division problems involving dosages can be done manually. The basic steps in multiplication and division are reviewed in this chapter. In addition, a number of shortcuts will be introduced that can make numbers, especially those containing decimal fractions, easier to work with. And for those limited number of calculations that are more safely handled with a calculator, safety in calculator use will be introduced.

**MULTIPLICATION OF DECIMALS**

The main precaution in multiplication of decimals is the placement of the decimal point in the answer, which is called the product.

The decimal point in the product of decimal fractions is placed the same number of places to the left in the product as the total of numbers after the decimal points in the fractions multiplied.

**EXAMPLE 1**

Multiply 0.35 by 0.5

It is safer to begin by lining up the numbers to be multiplied on the right side. Then, disregard the decimals during multiplication.

\[
0.35 \\times \ 0.5 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ 175
\]

The product is 175; 0.35 has two numbers after the decimal and 0.5 has one. Place the decimal point three places to the left in the product to make it .175, then add a zero (0) in front of the decimal to emphasize the fraction.

Answer = 0.175
EXAMPLE 2
Multiply 1.61 by 0.2

\[
\begin{array}{c}
\times \\
0.2 \\
\hline
322
\end{array}
\]

line up the numbers on the right

The product is 322; 1.61 has two numbers after the decimal point and 0.2 has one. Place the decimal point three places to the left in the product so that 322 becomes .322, then add a zero in front of the decimal to emphasize the fraction.

Answer = 0.322

If the product contains insufficient numbers for correct placement of the decimal point, add as many zeros as necessary to the left of the product to correct this.

EXAMPLE 3
Multiply 1.5 by 0.06

\[
\begin{array}{c}
\times \\
0.06 \\
\hline
90
\end{array}
\]

The product is 90; 1.5 has one number after the decimal point and 0.06 has two. To place the decimal three places to the left in the product, a zero must be added, making it .090. Eliminate the excess zero from the end of the fraction, and add a zero in front of the decimal point.

Answer = 0.09

EXAMPLE 4
Multiply 0.21 by 0.32

\[
\begin{array}{c}
\times \\
0.32 \\
\hline
672
\end{array}
\]

In this example, 0.21 has two numbers after the decimal point and 0.32 also has two. Add a zero in front of 672 to allow correct placement of the decimal point, making it .0672, then add a zero in front of the fraction to emphasize it.

Answer = 0.0672

EXAMPLE 5
Multiply 0.12 by 0.2

\[
\begin{array}{c}
\times \\
0.2 \\
\hline
24
\end{array}
\]

In this example, there are a total of three numbers after the decimal points in 0.12 and 0.2. Add a zero in front of 24 for correct decimal placement, making it .024, then add a zero in front of .024 to emphasize the fraction.

Answer = 0.024
Problems 2.1

Multiply these decimal fractions without using a calculator.

1. $0.45 \times 0.2 = \quad$ 6. $2.14 \times 0.03 = \quad$
2. $0.35 \times 0.12 = \quad$ 7. $1.4 \times 0.4 = \quad$
3. $1.3 \times 0.05 = \quad$ 8. $3.3 \times 1.2 = \quad$
4. $0.7 \times 0.04 = \quad$ 9. $2.7 \times 2.2 = \quad$
5. $0.4 \times 0.17 = \quad$ 10. $2.1 \times 0.3 = \quad$

Answers 1. 0.09 2. 0.042 3. 0.065 4. 0.028 5. 0.068 6. 0.0642 7. 0.56 8. 3.96 9. 5.94 10. 0.63

DIVISION OF DECIMAL FRACTIONS

A calculator may be used for all division of decimal fractions. However, let's start by reviewing the terminology of common fraction division and three important precalculator steps that may make final division easier: elimination of decimal points, reduction of the fractions, and reduction of numbers ending in zero. The following is a sample of a common fraction division seen in dosages involving ratio and proportion.

**Example 1**

\[
\frac{0.25}{0.125} = \frac{\text{numerator}}{\text{denominator}}
\]

You'll recall that the top number in a common fraction is called the numerator, whereas the bottom number is called the denominator. If you have trouble remembering which is which, think of D, for down, for denominator. The denominator is on the bottom. With this basic terminology reviewed, we are now ready to look at preliminary math steps that can be used to simplify a fraction or actually solve an equation before calculator division.

**Elimination of Decimal Points**

Decimal points can be eliminated from numbers in a decimal fraction without changing its value as long as they are moved the same number of places in one numerator and one denominator.

To eliminate the decimal points from decimal fractions, move them the same number of places to the right in a numerator and a denominator until they are eliminated from both. Zeros may have to be added to accomplish this.

**Example 1**

\[
\frac{0.25}{0.125} \text{ becomes } \frac{250}{125}
\]

The decimal point must be moved three places to the right in the denominator 0.125 to make it 125. Therefore, it must be moved three places to the right in the numerator 0.25, which requires the addition of one zero to make it 250.
EXAMPLE 2

\[
\frac{0.3}{0.15} \quad \text{becomes} \quad \frac{30}{15}
\]

The decimal point must be moved two places in 0.15 to make it 15, so it must be moved two places in 0.3, which requires the addition of one zero to become 30.

EXAMPLE 3

\[
\frac{1.5}{\frac{2}{2}} \quad \text{becomes} \quad \frac{15}{\frac{20}{2}}
\]

Move the decimal point one place in 1.5 to make it 15; add one zero to 2 to make it 20.

EXAMPLE 4

\[
\frac{4.5}{\frac{0.95}{0.95}} \quad \text{becomes} \quad \frac{450}{95}
\]

Eliminating the decimal points from a decimal fraction before final division does not alter the value of the fraction or the answer obtained in the final division.

Problems 2.2

Eliminate the decimal points from these common fractions.

1. \[\frac{17.5}{2} = \quad \frac{175}{20} \]
2. \[\frac{0.5}{\frac{25}{25}} = \quad \frac{5}{250} \]
3. \[\frac{6.3}{\frac{0.6}{0.6}} = \quad \frac{63}{6} \]
4. \[\frac{3.76}{\frac{0.4}{0.4}} = \quad \frac{376}{40} \]
5. \[\frac{8.4}{\frac{0.7}{0.7}} = \quad \frac{84}{7} \]
6. \[\frac{0.1}{\frac{0.05}{0.05}} = \quad \frac{10}{5} \]
7. \[\frac{0.9}{\frac{0.03}{0.03}} = \quad \frac{90}{3} \]
8. \[\frac{10.75}{\frac{2.5}{2.5}} = \quad \frac{1075}{250} \]
9. \[\frac{0.4}{\frac{0.04}{0.04}} = \quad \frac{40}{4} \]
10. \[\frac{1.2}{\frac{0.4}{0.4}} = \quad \frac{12}{4} \]

Answers

1. \[\frac{175}{20} \]
2. \[\frac{5}{250} \]
3. \[\frac{63}{6} \]
4. \[\frac{376}{40} \]
5. \[\frac{84}{7} \]
6. \[\frac{10}{5} \]
7. \[\frac{90}{3} \]
8. \[\frac{1075}{250} \]
9. \[\frac{40}{4} \]
10. \[\frac{12}{4} \]

REDUCTION OF FRACTIONS

Once the decimal points are eliminated, a second simplification step is to reduce the numbers as far as possible using common denominators/divisors.

To reduce fractions, divide both numbers by their greatest common denominator (the largest number that will divide into both).
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The **greatest common denominator** is usually 2, 3, 4, 5, or multiples of these numbers, such as 6, 8, 25, and so on.

**EXAMPLE 1**

\[
\frac{175}{20} = \frac{35}{4}
\]

The greatest common denominator is 5.

**EXAMPLE 2**

\[
\frac{63}{6} = \frac{21}{2}
\]

The greatest common denominator is 3.

**EXAMPLE 3**

\[
\frac{1075}{250} = \frac{43}{10}
\]

The greatest common denominator is 25.

There is a second way you could have reduced the fraction in example 3, and it is equally as correct. Divide by 5, then by 5 again.

\[
\frac{1075}{250} = \frac{215}{50} = \frac{43}{10}
\]

If the greatest common denominator is difficult to determine, reduce several times by using smaller common denominators.

**EXAMPLE 4**

\[
\frac{376}{40} = \frac{47}{5}
\]

Divide by 8.

Or divide by 4, then 2

\[
\frac{376}{40} = \frac{94}{10} = \frac{47}{5}
\]

Or divide by 2, then 2, then 2

\[
\frac{376}{40} = \frac{188}{20} = \frac{94}{10} = \frac{47}{5}
\]

Remember that **simple numbers are easiest to work with**, and the time spent in extra reductions may be well worth the payoff in safety.

**Problems 2.3**

Reduce these fractions in preparation for final division.

1. \[
\frac{84}{8} = \text{_________}
\]

2. \[
\frac{20}{16} = \text{_________}
\]

3. \[
\frac{250}{325} = \text{_________}
\]

4. \[
\frac{96}{34} = \text{_________}
\]

5. \[
\frac{175}{20} = \text{_________}
\]

6. \[
\frac{40}{14} = \text{_________}
\]
REDUCTION OF NUMBERS ENDING IN ZERO

The third type of simplification is not solely related to decimal fractions but is best covered at this time. This concerns reductions in a common fraction when both a numerator and a denominator end with zeros.

Numbers that end in a zero or zeros may initially be reduced by crossing off the same number of zeros in both a numerator and a denominator.

**EXAMPLE 1**

\[
\frac{800}{250} = \frac{80}{25} \quad \text{Reduce by 5} = \frac{16}{5}
\]

In this fraction, the numerator, 800, has two zeros, but the denominator, 250, has one zero. The number of zeros crossed off must be the same in both numerator and denominator, so only one zero can be eliminated from each.

**EXAMPLE 2**

\[
\frac{2400}{2000} = \frac{24}{20} \quad \text{Reduce by 4} = \frac{6}{5}
\]

Two zeros can be eliminated from the denominator and the numerator in this fraction.

**EXAMPLE 3**

\[
\frac{15000}{30000} = \frac{15}{30} \quad \text{Reduce by 5} = \frac{3}{6}
\]

In this fraction three zeros can be eliminated.

**Problems 2.4**

Reduce these fractions to their lowest terms.

1. \[\frac{50}{250} = \quad \]
2. \[\frac{120}{50} = \quad \]
3. \[\frac{2500}{1500} = \quad \]
4. \[\frac{1,000,000}{750,000} = \quad \]
5. \[\frac{800}{150} = \quad \]
6. \[\frac{110}{100} = \quad \]
Chapter 2  Multiplication and Division of Decimals

7. \[ \frac{200,000}{150,000} = \ldots \]  
9. \[ \frac{60}{40} = \ldots \]

8. \[ \frac{1000}{800} = \ldots \]  
10. \[ \frac{150}{200} = \ldots \]

**Answers**  
1. \( \frac{1}{5} \)  
2. \( \frac{12}{5} \)  
3. \( \frac{5}{3} \)  
4. \( \frac{4}{3} \)  
5. \( \frac{16}{3} \)  
6. \( \frac{11}{10} \)  
7. \( \frac{4}{3} \)  
8. \( \frac{5}{4} \)  
9. \( \frac{3}{2} \)  
10. \( \frac{3}{4} \)

**USING A CALCULATOR**

Calculators vary in how addition, subtraction, division, and multiplication must be entered and in the number of fractional numbers displayed after the decimal point. The first precaution in calculator use is to ensure you **know how to use the one available to you**. If you must do frequent calculations, it would be wise to buy and use your own. The next precaution—and this is critical—is to enter decimal numbers correctly, which includes **entering the decimal points**. This is not as easy to remember as it sounds, and this step is where dosage calculation errors can occur.

Calculator entry errors tend to be repetitive, so visually check each entry before entering the next.

**EXPRESSING TO THE NEAREST TENTH**

When a fraction is reduced as much as possible, it is ready for final division. This is done using a calculator to **divide the numerator by the denominator**. Answers are most often rounded off and expressed as decimal numbers to the nearest tenth.

To express an answer to the nearest tenth, the division is carried to hundredths (two places after the decimal). When the number representing hundredths is 5 or larger, the number representing tenths is increased by one.

**EXAMPLE 1**

\[ \frac{0.35}{0.4} = 0.35 \div 0.4 = 0.87 \]

Answer = 0.9

The number representing hundredths is 7, so the number representing tenths is increased by one: 0.87 becomes 0.9.

**EXAMPLE 2**

\[ \frac{0.5}{0.3} = 0.5 \div 0.3 = 1.66 = 1.7 \]

The number representing hundredths, 6, is larger than 5, so 1.66 becomes 1.7.

**EXAMPLE 3**

\[ \frac{0.16}{0.3} = 0.53 = 0.5 \]

The number representing hundredths, 3, is less than 5, so the number representing tenths, 5, remains unchanged.
EXAMPLE 4 \[
\frac{0.2}{0.3} = 0.66 = 0.7
\]

EXAMPLE 5 An answer of 1.42 remains 1.4.

EXAMPLE 6 An answer of 1.86 becomes 1.9.

**Problems 2.5**

Use a calculator to divide these common fractions. Express answers to the nearest tenth.

1. \( \frac{5.1}{2.3} = \)  
2. \( \frac{0.9}{0.7} = \)  
3. \( \frac{3.7}{2} = \)  
4. \( \frac{6}{1.3} = \)  
5. \( \frac{1.5}{2.1} = \)  
6. \( \frac{2.7}{1.1} = \)  
7. \( \frac{4.2}{5} = \)  
8. \( \frac{0.5}{2.5} = \)  
9. \( \frac{5.2}{0.91} = \)  
10. \( \frac{2.4}{2.7} = \)

**Answers** 1. 2.2 2. 1.3 3. 1.9 4. 4.6 5. 0.7 6. 2.5 7. 0.8 8. 0.2 9. 5.7 10. 0.9

**EXPRESSING TO THE NEAREST HUNDREDTH**

Some drugs are administered in dosages carried to the nearest hundredth. This is common in pediatric dosages and in drugs that alter a vital function of the body; for example, heart rate.

To express an answer to the nearest hundredth, the division is carried to thousandths (three places after the decimal point). When the number representing thousandths is 5 or larger, the number representing hundredths is increased by one.

**EXAMPLE 1** 0.736 becomes 0.74

The number representing thousandths, 6, is larger than 5, so the number representing hundredths, 3, is increased by one to become 4.

**EXAMPLE 2** 0.777 becomes 0.78
EXAMPLE 3

0.373 remains 0.37
The number representing thousandths, 3, is less than 5, so the number representing hundredths, 7, remains unchanged.

EXAMPLE 4

0.934 remains 0.93

Problems 2.6

Express these numbers to the nearest hundredth.

1. 0.175 = _________
2. 0.344 = _________
3. 1.853 = _________
4. 0.306 = _________
5. 3.015 = _________
6. 2.154 = _________
7. 1.081 = _________
8. 1.327 = _________
9. 0.739 = _________
10. 0.733 = _________
11. 2.072 = _________
12. 0.089 = _________

Answers: 1. 0.18  2. 0.34  3. 1.85  4. 0.31  5. 3.02  6. 2.15  7. 1.08  8. 1.33  9. 0.74  10. 0.73  11. 2.07  12. 0.09

Summary

This concludes the chapter on multiplication and division of decimals. The important points to remember from this chapter are:

- When decimal fractions are multiplied manually, the decimal point is placed the same number of places to the left in the product as the total of numbers after the decimal points in the fractions multiplied.

- Zeros must be placed in front of a product if it contains insufficient numbers for the correct placement of the decimal point.

- Excess zeros are eliminated in dosages.

- To simplify fractions for final division, the preliminary steps of eliminating decimal points, reducing the numbers by common denominators, and reducing numbers ending in zeros can be used.

- Practice using a calculator until proficiency is achieved.

- Calculator running totals should be disregarded because they can cause confusion.

- All calculator entries and answers must be double-checked.

- A personal calculator is a must if frequent calculations are necessary.

- To express to tenths, increase the answer by one if the number representing the thousandths is 5 or larger.

- To express to hundredths, increase the answer by one if the number representing the thousandths is 5 or larger.
Summary Self-Test

Multiply these decimals. A calculator may be used.

1. \(1.49 \times 0.05 = \) ________
2. \(0.15 \times 3.04 = \) ________
3. \(0.025 \times 3.5 = \) ________
4. \(0.55 \times 2.5 = \) ________
5. \(1.31 \times 2.07 = \) ________
6. \(5.3 \times 1.02 = \) ________
7. \(0.35 \times 1.25 = \) ________
8. \(4.32 \times 0.05 = \) ________
9. \(0.2 \times 0.02 = \) ________
10. \(0.4 \times 1.75 = \) ________

11. You are to administer four tablets with a dosage strength of 0.04 mg each. What total dosage are you giving?
12. You have given 2½ (2.5) tablets with a strength of 1.25 mg per tablet. What total dosage is this?
13. The tablets your patient is to receive are labeled 0.1 mg, and you are to give 3½ (3.5) tablets. What total dosage is this?
14. You gave your patient 3 tablets labeled 0.75 mg each, and he was to receive a total of 2.25 mg. Did he receive the correct dosage?
15. The tablets available for your patient are labeled 12.5 mg, and you are to give 4½ (4.5) tablets. What total dosage will this be?
16. Your patient is to receive a dosage of 4.5 mg. The tablets available are labeled 3.5 mg, and there are 2½ tablets in his medication drawer. Is this a correct dosage?

Use a calculator to divide these fractions. Express answers to the nearest tenth.

17. \(\frac{1.3}{0.7} = \) ________
18. \(\frac{1.9}{3.2} = \) ________
19. \(\frac{32.5}{9} = \) ________
20. \(\frac{0.04}{0.1} = \) ________
21. \(\frac{1.45}{1.2} = \) ________
22. \(\frac{250}{1000} = \) ________
23. \(\frac{0.8}{0.09} = \) ________
24. \(\frac{2,000,000}{1,500,000} = \) ________
25. \(\frac{4.1}{2.05} = \) ________
26. \(\frac{7.3}{12} = \) ________
27. \(\frac{150,000}{120,000} = \) ________
28. \(\frac{0.15}{0.08} = \) ________
29. \(\frac{2700}{900} = \) ________
30. \(\frac{0.25}{0.15} = \) ________
Chapter 2  Multiplication and Division of Decimals

Use a calculator to divide these fractions. Express answers to the nearest hundredth.

31. \[
\frac{900}{1700} = \_\_\_\_\_\_\_
\]

41. \[
0.13 \quad 0.25 = \_\_\_\_\_\_
\]

32. \[
\frac{0.125}{0.3} = \_\_\_\_\_\_
\]

42. \[
0.25 \quad 0.7 = \_\_\_\_\_\_
\]

33. \[
\frac{1450}{1500} = \_\_\_\_\_\_
\]

43. \[
3.3 \quad 5.1 = \_\_\_\_\_\_
\]

34. \[
\frac{65}{175} = \_\_\_\_\_\_
\]

44. \[
0.19 \quad 0.7 = \_\_\_\_\_\_
\]

35. \[
\frac{0.6}{1.35} = \_\_\_\_\_\_
\]

45. \[
1.1 \quad \frac{1}{3} = \_\_\_\_\_\_
\]

36. \[
\frac{0.04}{0.12} = \_\_\_\_\_\_
\]

46. \[
3 \quad \frac{4}{1} = \_\_\_\_\_\_
\]

37. \[
\frac{750}{10,000} = \_\_\_\_\_\_
\]

47. \[
\frac{62}{240} = \_\_\_\_\_\_
\]

38. \[
\frac{0.65}{0.8} = \_\_\_\_\_\_
\]

48. \[
\frac{280,000}{300,000} = \_\_\_\_\_\_
\]

39. \[
\frac{3.01}{4.2} = \_\_\_\_\_\_
\]

49. \[
\frac{115}{255} = \_\_\_\_\_\_
\]

40. \[
\frac{4.5}{6.1} = \_\_\_\_\_\_
\]

50. \[
\frac{10}{14.3} = \_\_\_\_\_\_
\]

---

**Answers**

1. 0.0745
2. 0.4356
3. 0.0875
4. 1.375
5. 2.7117
6. 5.406
7. 0.4375
8. 0.216
9. 0.004
10. 0.7
11. 0.16 mg
12. 3.125 mg
13. 0.35 mg
14. Yes
15. 56.25 mg
16. No
17. 1.9
18. 0.6
19. 3.6
20. 0.4
21. 1.2
22. 0.3
23. 8.9
24. 1.3
25. 2
26. 0.6
27. 1.3
28. 1.9
29. 3
30. 1.7
31. 0.53
32. 0.42
33. 0.97
34. 0.37
35. 0.44
36. 0.33
37. 0.08
38. 0.81
39. 0.72
40. 0.74
41. 0.52
42. 0.36
43. 0.65
44. 0.27
45. 0.85
46. 0.73
47. 0.26
48. 0.93
49. 0.45
50. 0.7
The majority of clinical drug dosage calculation involve solving an equation containing one to five common fractions. Two examples are:

\[
\frac{2}{5} \times \frac{3}{4} \quad \text{and} \quad \frac{2}{20} \times \frac{1}{1000} \times \frac{1}{60,000}
\]

Two options are available to solve common fraction equations: calculator use throughout, or initial fraction reduction followed by calculator use for final division. Both options are presented in this chapter, and you may use whichever you wish or whichever your instructor requires.

Prerequisites

Objectives

The learner will solve equations containing:

1. whole numbers
2. decimal numbers
3. multiple numbers.

Common fraction equations are solved by dividing the numerators by the denominators.

Calculator solution of equations is most safely done by concentrating only on the entries being made, not the numbers that register and change throughout the calculation. It’s important that you do the calculations for each example and then compare them with the math provided. Just reading the examples will not teach you the calculation skills you need. The examples and problems provided incorporate all the content covered in the first two chapters. They represent the full range of calculations you will be doing on a continuing basis.

The learner will solve equations containing:

1. whole numbers
2. decimal numbers
3. multiple numbers.

Objectives

The learner will solve equations containing:

1. whole numbers
2. decimal numbers
3. multiple numbers.

Common fraction equations are solved by dividing the numerators by the denominators.

2 \times 3 \quad \frac{5}{3} \times \frac{4}{1} \quad 20 \times \frac{1}{1000} \times \frac{1}{60,000}

Two options are available to solve common fraction equations: calculator use throughout, or initial fraction reduction followed by calculator use for final division. Both options are presented in this chapter, and you may use whichever you wish or whichever your instructor requires.
WHOLE NUMBER EQUATIONS

EXAMPLE 1
Option 1: Calculator Use Throughout

\[ \frac{2}{5} \times \frac{3}{4} \]

\[ 2 \times 3 \div 5 \div 4 \]

multiply the numerators, 2 and 3, and then divide by
the denominators, 5 then 4, in continuous entries

\[ = 0.3 \]

Answer = 0.3 (tenth)

Option 2: Initial Reduction of Fractions

\[ \frac{2}{5} \times \frac{3}{4} \]

\[ \frac{1}{2} \times \frac{3}{4} \]

divide the numerator, 2, and the denominator, 4, by 2 (to
become 1 and 2)

\[ \frac{3}{5} \div 2 \]

use the calculator to divide the remaining numerator, 3, by
the remaining denominators, 5 and 2

\[ = 0.3 \]

Answer = 0.3 (tenth)

Initial reduction of fractions in an equation can simplify final
calculator entries, especially if the numbers are large, or contain
decimal fractions or zeros.

EXAMPLE 2
Option 1: Calculator Use Throughout

\[ \frac{250}{175} \times \frac{150}{325} \]

\[ 250 \times 150 \div 175 \div 325 \]

multiply the numerators, 250 and 150, then
divide by the denominators, 175 and 325

\[ = 0.659 \]

Answer = 0.7 (tenth) or 0.66 (hundredth)

Option 2: Initial Reduction of Fractions

\[ \frac{250}{175} \times \frac{150}{325} \]

\[ \frac{10}{7} \times \frac{6}{13} \]

divide the numerator, 250, and the denominator, 175,
by 25 (to become 10 and 7); divide the numerator, 150,
and denominator, 325, by 25 (to become 6 and 13)

\[ 10 \times 6 \div 7 \div 13 \]

use the calculator to multiply the numerators, 10
and 6, then divide by the denominators, 7 and 13

\[ = 0.659 \]

Answer = 0.7 (tenth) or 0.66 (hundredth)
Option 1: Calculator Use Throughout

\[
\frac{7}{50} \times \frac{25}{3} \times \frac{120}{32}
\]

\[
7 \times 25 \times 120 \div 50 \div 3 \div 32
\]

\[
= 4.375
\]

Answer = \text{4.4 (tenth) or 4.38 (hundredth)}

Option 2: Initial Reduction of Fractions

\[
\frac{7}{50} \times \frac{25}{3} \times \frac{120}{32}
\]

\[
\frac{7}{50} \times \frac{1}{3} \times \frac{120}{32}
\]

\[
= \frac{7 \times 15 \div 2 \div 3 \div 4}{50} = 4.375
\]

Answer = \text{4.4 (tenth) or 4.38 (hundredth)}

Option 1: Calculator Use Throughout

\[
\frac{20}{1} \times \frac{1000}{60,000} \times \frac{1200}{1} \times \frac{1}{60}
\]

\[
20 \times 1000 \times 1200 \div 60,000 \div 60
\]

\[
= 6.666
\]

Answer = \text{6.7 (tenth) or 6.67 (hundredth)}

Option 2: Initial Reduction of Fractions

\[
\frac{20}{1} \times \frac{1000}{60,000} \times \frac{1200}{1} \times \frac{1}{60}
\]

\[
\frac{20}{1} \times \frac{1000}{60,000} \times \frac{1200}{1} \times \frac{1}{60}
\]

\[
20 \div 3
\]

\[
= 6.666
\]

Answer = \text{6.7 (tenth) or 6.67 (hundredth)}
EXAMPLE 5

**Option 1: Calculator Use Throughout**

\[
\frac{2000}{1500} \times \frac{2500}{3000} = 1.111 \\
\text{Answer = 1.1 (tenth) or 1.11 (hundredth)}
\]

**Option 2: Initial Reduction of Fractions**

\[
\frac{2000}{1500} \times \frac{2500}{3000} = 1.111 \\
\text{Answer = 1.1 (tenth) or 1.11 (hundredth)}
\]

**Problems 3.1**

Solve these equations. Express answers to the nearest tenth and hundredth. A calculator may be used.

1. \(\frac{3}{8} \times \frac{6}{3} = \) \[\text{________} \quad \text{________} \]
2. \(\frac{3}{4} \times \frac{10}{2} = \) \[\text{________} \quad \text{________} \]
3. \(\frac{3}{5} \times \frac{1050}{40} = \) \[\text{________} \quad \text{________} \]
4. \(\frac{10}{1} \times \frac{750}{40,000} \times \frac{1000}{1} \times \frac{1}{60} = \) \[\text{________} \quad \text{________} \]
5. \(\frac{12}{1} \times \frac{500}{2700} \times \frac{2000}{1} \times \frac{1}{60} = \) \[\text{________} \quad \text{________} \]
6. \(\frac{1500}{750} \times \frac{350}{600} = \) \[\text{________} \quad \text{________} \]
7. \(\frac{1000}{2700} \times \frac{1300}{500} \times \frac{70}{50} = \) \[\text{________} \quad \text{________} \]
8. \(\frac{15}{1} \times \frac{2500}{20,000} \times \frac{1000}{1} \times \frac{1}{60} = \) \[\text{________} \quad \text{________} \]
Decimal fraction equations raise an instant warning flag in calculations because it is here that most dosage errors occur. As with whole number equations, simplifying the numbers by eliminating decimal points and reducing the numbers is an optional first step. If you elect to do the entire calculation with a calculator, be sure to enter the decimal points carefully. Double-check all calculator entries and answers.

**Example 1**

**Option 1: Calculator Use Throughout**

\[
\begin{align*}
&\frac{0.3}{1.65} \times \frac{2.5}{1} \\
= &\frac{0.3 \times 2.5}{1.65} \\
= &\frac{0.75}{1.65} \\
= &\frac{0.45}{1} \\
= &0.45
\end{align*}
\]

Answer = 0.5 (tenth) or 0.45 (hundredth)

**Option 2: Initial Elimination of Decimal Points and Reduction of Fractions**

\[
\begin{align*}
&\frac{30}{165} \times \frac{25}{10} \\
= &\frac{3 \times 5}{33 \times 1} \\
= &\frac{15}{33} \\
= &\frac{5}{11} \\
= &0.454
\end{align*}
\]

Answer = 0.5 (tenth) or 0.45 (hundredth)
EXAMPLE 2

Option 1: Calculator Use Throughout

\[
0.3 \times \frac{2.1}{1.2} \div 0.15
\]

multiply 0.3 by 2.1, then divide by 1.2 and 0.15

= 3.5

Answer = 3.5 (tenth) or 3.5 (hundredth)

Option 2: Initial Elimination of Decimal Points and Reduction of Fractions

\[
0.3 \times \frac{2.1}{1.2} \div 0.15
\]

eliminate the decimal points by moving them one place in 0.3 and 1.2 (to become 3 and 12) and two places in 2.1 and 0.15 (to become 210 and 15)

\[
\frac{3}{12} \times \frac{210}{15}
\]

divide 3 and 12 by 3, then divide 210 and 15 by 5

\[
\frac{1}{4} \times \frac{42}{3}
\]

divide 42 and 4 by 2

\[
21 \div 2 \div 3
\]

use a calculator to divide the numerator, 21, by 2 and then by 3

= 3.5

Answer = 3.5 (tenth) or 3.5 (hundredth)

EXAMPLE 3

Option 1: Calculator Use Throughout

\[
0.15 \times \frac{3.1}{2}
\]

multiply 0.15 by 3.1, divide by 0.17, and then divide by 2

= 1.367

Answer = 1.4 (tenth) or 1.37 (hundredth)
Option 2: Initial Elimination of Decimal Points and Reduction of Fractions

\[
\begin{align*}
0.15 \times 3.1 & = 0.455 = \frac{91}{200} \\
0.17 \times \frac{31}{2} & = \frac{51.7}{20} = \frac{258.5}{100} = 2.585 = \frac{231}{88}
\end{align*}
\]

move the decimal point two places in 0.15 and 0.17 and one place in 3.1 and 2 (requires adding a zero to 2)

\[
\begin{align*}
\frac{3}{18} \times \frac{31}{20} & = \frac{93}{360} = \frac{31}{120}
\end{align*}
\]

divide 15 and 20 by 5

\[
\begin{align*}
3 \times 31 & = 93 & 17 \div 4 & = 4.25
\end{align*}
\]

complete this with a calculator

\[
\begin{align*}
1.367
\end{align*}
\]

Answer = 1.4 (tenth) or 1.37 (hundredth)

---

**Example 4**

Option 1: Calculator Use Throughout

\[
\begin{align*}
2.5 \times 1.2 & = 3 & 1.5 \div 1.1 & = 1.363636\ldots
\end{align*}
\]

\[
\begin{align*}
2.5 \times 1.2 & = 3 & 1.5 \div 1.1 & = 1.363636\ldots
\end{align*}
\]

\[
\begin{align*}
2.5 \times 1.2 & = 3 & 1.5 \div 1.1 & = 1.363636\ldots
\end{align*}
\]

\[
\begin{align*}
= 1.818 & = 1.818 & = 1.818
\end{align*}
\]

Answer = 1.8 (tenth) or 1.82 (hundredth)

Option 2: Initial Elimination of Decimal Points and Reduction of Fractions

\[
\begin{align*}
\frac{25}{15} \times \frac{12}{11} & = \frac{5}{3} \times \frac{4}{11} \times \frac{12}{11} = \frac{5 \times 4 \times 12}{3 \times 11 \times 11} = \frac{240}{363} = \frac{80}{121}
\end{align*}
\]

\[
\begin{align*}
5 \times 4 & = 20 & 11 & = 11
\end{align*}
\]

\[
\begin{align*}
= 1.818 & = 1.818 & = 1.818
\end{align*}
\]

Answer = 1.8 (tenth) or 1.82 (hundredth)
Problems 3.2

Solve these equations. Express answers to the nearest tenth and hundredth. A calculator may be used.

1. \( \frac{2.1}{1.15} \times \frac{0.9}{1.2} = \quad \) 6. \( \frac{0.75}{1.15} \times \frac{3}{1.25} = \quad \)
2. \( \frac{3.1}{2.7} \times \frac{2.2}{1.4} = \quad \) 7. \( \frac{10.2}{1.5} \times \frac{2}{5.1} = \quad \)
3. \( \frac{0.3}{1.2} \times \frac{3}{2.1} = \quad \) 8. \( \frac{0.125}{0.25} \times \frac{2.5}{1.5} = \quad \)
4. \( \frac{0.17}{0.3} \times \frac{2.5}{1.5} = \quad \) 9. \( \frac{0.9}{0.3} \times \frac{1.2}{1.4} = \quad \)
5. \( \frac{1.75}{0.95} \times \frac{1.5}{2} = \quad \) 10. \( \frac{0.35}{1.7} \times \frac{2.5}{0.7} = \quad \)

Answers:
1. 1.4; 1.37
2. 1.8; 1.8
3. 0.4; 0.36
4. 0.9; 0.94
5. 1.4; 1.38
6. 1.6; 1.57
7. 2.7; 2.67
8. 0.8; 0.83
9. 2.6; 2.57
10. 0.7; 0.74

MULTIPLE-NUMBER EQUATIONS

The calculation steps already practiced are also used for multiple-number equations, which occur frequently in advanced clinical calculations. Reduction of numbers may be of particular benefit here because calculations of this type sometimes have numbers that cancel and/or reduce dramatically. Answers are expressed to the nearest whole number in the examples and problems that follow to replicate actual clinical calculations.

Example 1: Calculator Use Throughout

\[
\frac{60}{1} \times \frac{1000}{4} \times \frac{1}{1000} \times \frac{6}{1}
\]

\[
60 \times 1000 \times 6 \div 4 \div 1000 \quad \text{multiply 60 by 1000, then by 6; divide by 4 and 1000}
\]

\[
= 90
\]

Answer = 90
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Option 2: Initial Reduction of Fractions

\[
\frac{60}{1} \times \frac{1000}{4} \times \frac{1}{1000} \times \frac{6}{1}
\]

\[
\frac{60}{1} \times \frac{1000}{4} \times \frac{1}{1000} \times \frac{6}{1}
\]

eliminate 1000 from a numerator and denominator, then divide 6 and 4 by 2

\[60 \times 3 \div 2\]
multiply 60 by 3, then divide by 2

\[= 90\]

Answer = 90  
the answer is obtained by cancellation alone

EXAMPLE 2

Option 1: Calculator Use Throughout

\[
\frac{20}{1} \times \frac{75}{1} \times \frac{1}{60}
\]

\[20 \times 75 \div 60\]
multiply 20 by 75, then divide by 60

\[= 25\]

Answer = 25

Option 2: Initial Reduction of Fractions

\[
\frac{20}{1} \times \frac{75}{1} \times \frac{1}{60}
\]

\[
\frac{20}{1} \times \frac{75}{1} \times \frac{1}{60}
\]

divide 20 and 60 by 20 to become 1 and 3, then divide 75 and 3 by 3 to become 25 and 1

\[= 25\]

Answer = 25  
the answer is obtained by cancellation alone

EXAMPLE 3

Option 1: Calculator Use Throughout

\[
\frac{2}{0.5} \times \frac{1}{100} \times \frac{275}{1}
\]

\[2 \times 275 \div 0.5 \div 100\]
multiply 2 by 275, then divide by 0.5 and 100

\[= 11\]

Answer = 11
Option 2: Initial Reduction of Fractions

\[
\frac{0.5}{1} \times \frac{1}{100} \times \frac{275}{1}
\]

eliminate the decimal point by moving it one place in 0.5 and one place in 2, which requires adding a zero to 2 (to become 5 and 20)

\[
\frac{20}{5} \times \frac{1}{100} \times \frac{275}{1}
\]

divide 20 and 100 by 20, then divide 275 and 5 by 5

\[
\frac{5}{1} \times \frac{11}{5}
\]

divide 5 and 55 by 5

= 11
Answer = 11 the answer is obtained by cancellation alone

EXAMPLE 4

Option 1: Calculator Use Throughout

\[
\frac{1}{60} \times \frac{1}{12} \times \frac{10}{1} \times \frac{750}{1}
\]

10 \times 750 \div 60 \div 12

= 10.4
Answer = 10

Option 2: Initial Reduction of Fractions

\[
\frac{1}{60} \times \frac{1}{12} \times \frac{10}{1} \times \frac{750}{1}
\]

\[
\frac{1}{60} \times \frac{1}{12} \times \frac{10}{1} \times \frac{750}{1}
\]

375 \div 6 \div 6

= 10.4
Answer = 10
Problems 3.3

Solve these equations. Express answers to the nearest whole number.

1. \( \frac{15}{1} \times \frac{350}{5} \times \frac{1}{60} = \quad \)
   \( \frac{5}{1} \times \frac{320}{1.5} \times \frac{1}{60} = \quad \)

2. \( \frac{1}{32} \times \frac{60}{1} \times \frac{7.5}{3.1} = \quad \)
   \( \frac{100}{1} \times \frac{1750}{200} \times \frac{1}{60} = \quad \)

3. \( \frac{10}{1} \times \frac{2500}{24} \times \frac{1}{60} = \quad \)
   \( \frac{60}{1} \times \frac{1150}{200} \times \frac{1}{100} = \quad \)

4. \( \frac{1.7}{2.3} \times \frac{15.3}{12.1} \times \frac{6.2}{0.3} = \quad \)
   \( \frac{25}{4} \times \frac{1000}{8} \times \frac{1}{60} = \quad \)

5. \( \frac{20}{1} \times \frac{1200}{16} \times \frac{1}{60} = \quad \)
   \( \frac{18}{10} \times \frac{120}{7} \times \frac{9}{17} = \quad \)

Answers 1. 18  2. 5  3. 17  4. 19  5. 25  6. 18  7. 15  8. 3  9. 13  10. 16

Summary

This concludes the chapter on solving common fraction equations. The important points to remember from this chapter are:

- Most clinical calculations consist of an equation containing one to five common fractions.
- In common fraction math, all the numerators are multiplied, then divided by the denominators.
- Numbers in an equation may initially be reduced to simplify final multiplication and division.
- Zeros may be eliminated from the same number of numerators and denominators without altering the value.
- Double check all calculator entries and answers.
- Answers may be expressed as whole numbers or to the nearest tenth or hundredth, depending on the calculation being done.

Summary Self-Test

Solve these equations. Express answers to the nearest tenth and hundredth.
A calculator may be used.

1. \( \frac{0.8}{0.65} \times \frac{1.2}{1} = \quad \)
   \( \frac{0.35}{1.3} \times \frac{4.5}{1} = \quad \)

2. \( \frac{350}{1000} \times \frac{4.4}{1} = \quad \)
   \( \frac{0.4}{1.5} \times \frac{2.3}{1} = \quad \)
5. \( \frac{1}{75} \times \frac{500}{1} \) = ___________  

6. \( \frac{0.15}{0.12} \times \frac{1.45}{1} \) = ___________  

7. \( \frac{100,000}{80,000} \times \frac{1.7}{1} \) = ___________  

8. \( \frac{1.45}{2.1} \times \frac{1.5}{1} \) = ___________  

9. \( \frac{1550}{500} \times \frac{0.5}{1} \) = ___________  

10. \( \frac{4}{0.375} \times \frac{0.25}{1} \) = ___________  

11. \( \frac{0.08}{0.1} \times \frac{2.1}{1} \) = ___________  

12. \( \frac{1.5}{1.25} \times \frac{1.45}{1} \) = ___________  

13. \( \frac{0.5}{0.15} \times \frac{0.35}{1} \) = ___________  

14. \( \frac{300,000}{200,000} \times \frac{1.7}{1} \) = ___________  

15. \( \frac{13.5}{10} \times \frac{1.8}{1} \) = ___________  

16. \( \frac{1,000,000}{800,000} \times \frac{1.4}{1} \) = ___________  

17. \( \frac{1.3}{0.2} \times \frac{0.25}{1} \) = ___________  

18. \( \frac{1.5}{0.1} \times \frac{0.25}{1} \) = ___________  

19. \( \frac{1.9}{3.5} \times \frac{3.2}{1.4} \) = ___________  

20. \( \frac{15,000}{7500} \times \frac{3.5}{1.2} \) = ___________  

21. \( \frac{4.7}{1.3} \times \frac{50}{20} \times \frac{4.25}{5} \times \frac{8.2}{2.1} \) = ___________  

22. \( \frac{40}{24} \times \frac{250}{5} \times \frac{0.375}{7.5} \) = ___________  

23. \( \frac{6.9}{21.6} \times \frac{250}{5} \times \frac{0.75}{2.1} \) = ___________  

24. \( \frac{1}{60} \times \frac{1}{25} \times \frac{10}{1} \times \frac{1000}{1} \) = ___________  

25. \( \frac{50.5}{22.75} \times \frac{4.7}{6.3} \times \frac{31.7}{10.2} \) = ___________
Solve these equations. Express answers to the nearest whole number. A calculator may be used.

26. \[
\frac{104}{95} \times \frac{20}{15} \times \frac{63}{1.6} = \]

27. \[
\frac{40,000}{10,000} \times \frac{30}{1} \times \frac{3.7}{12.5} = \]

28. \[
\frac{60}{1} \times \frac{500}{50} \times \frac{1}{1000} \times \frac{116}{1} = \]

29. \[
\frac{1.5}{0.6} \times \frac{10}{14} \times \frac{3.2}{5.3} \times \frac{100}{2} = \]

30. \[
\frac{60}{1} \times \frac{50}{250} \times \frac{1}{100} \times \frac{455}{1} = \]

31. \[
\frac{33.7}{15.9} \times \frac{19.2}{2.6} \times \frac{2.9}{3.85} = \]

32. \[
\frac{20}{4} \times \frac{100}{88} \times \frac{1200}{250} \times \frac{10}{30} = \]

33. \[
\frac{14}{7.9} \times \frac{88}{8} = \]

34. \[
\frac{10}{1} \times \frac{325}{1.5} \times \frac{1}{60} = \]

35. \[
\frac{60}{1} \times \frac{300}{400} \times \frac{1}{800} \times \frac{400}{1} = \]

36. \[
\frac{3.7}{1.3} \times \frac{12}{8} \times \frac{3.1}{7.4} \times \frac{5}{1} = \]

37. \[
\frac{20}{2} \times \frac{125}{25} \times \frac{2}{750} \times \frac{216}{1} = \]

38. \[
\frac{4}{3} \times \frac{45}{1} \times \frac{22.5}{37.8} = \]

39. \[
\frac{7.5}{12.3} \times \frac{55}{5} \times \frac{23.2}{1.2} = \]

40. \[
\frac{1000}{1} \times \frac{50}{250} \times \frac{20}{1} \times \frac{1}{60} = \]

41. \[
\frac{15}{1} \times \frac{1000}{4000} \times \frac{800}{1} \times \frac{1}{60} = \]

42. \[
\frac{15}{1} \times \frac{500}{3} \times \frac{1}{60} = \]

43. \[
\frac{25}{3} \times \frac{750}{8} \times \frac{0.1}{1} = \]

44. \[
\frac{40}{2} \times \frac{250}{50} \times \frac{1}{800} \times \frac{154}{1} = \]

45. \[
\frac{33}{4} \times \frac{75}{40} \times \frac{2}{150} \times \frac{432}{1} = \]

46. \[
\frac{22.5}{7} \times \frac{100}{5} \times \frac{1}{700} \times \frac{3}{80} \times \frac{3150}{1} = \]
47. \( \frac{100}{250} \times \frac{50}{1} \times \frac{27.5}{1.375} = \) 

48. \( \frac{2.2}{0.25} \times \frac{3.6}{1} \times \frac{3.7}{7.1} = \) 

49. \( \frac{1.3}{0.21} \times \frac{0.3}{2} \times \frac{10.1}{0.75} = \) 

50. \( \frac{27.5}{10} \times \frac{40}{7} \times \frac{8.5}{1.9} = \) 

Answers

1. 1.5; 1.48
2. 1.5; 1.54
3. 1.2; 1.21
4. 0.6; 0.61
5. 6.7; 6.67
6. 1.8; 1.81
7. 2.1; 2.13
8. 1; 1.04
9. 1.6; 1.55
10. 2.7; 2.67

11. 1.7; 1.68
12. 1.7; 1.74
13. 1.2; 1.17
14. 2.6; 2.55
15. 2.4; 2.43
16. 1.8; 1.75
17. 1.6; 1.63
18. 3.8; 3.75
19. 1.2; 1.24
20. 5.8; 5.83
21. 5.6; 5.65

22. 4.2; 4.17
23. 5.7; 5.7
24. 6.7; 6.67
25. 5.1; 5.15
26. 57
27. 36
28. 70
29. 54
30. 55
31. 12
32. 9

33. 19
34. 36
35. 23
36. 9
37. 29
38. 36
39. 130
40. 67
41. 50
42. 42
43. 78
44. 19
45. 89
46. 11
47. 400
48. 17
49. 13
50. 70