

Instructor's Guide

FUNDAMENTAL MATHEMATICS
for HEALTH
CAREERS

Jerome D. Hayden

Howard T. Davis

TO THE INSTRUCTOR

This text and instructor's guide are designed to help your students learn mathematics. Explanations are provided for the benefit of the student as well as the new teacher.

READING A TEXTBOOK

In preparation for the use of any text, the student should be able to observe the particular aids provided for him. For example, encourage him to answer some of these questions:

1. What does the Table of Contents tell me about the areas covered in this book?
2. When was this book copyrighted? Why is this important?
3. What is the difference between a section and a unit?
4. Does this book have spaces for me to write the answers or do I always need my own paper and pencil?
5. Does this book have an Index? Glossary? Appendix? If not, why not? If so, what information is available in them? When do I need to use them?
6. Is there an answer key available?

READING AND WRITING MATHEMATICS

Reading a mathematics textbook requires different skills than reading a novel. Students should be encouraged to develop some special skills. They should be made aware of the specializing in mathematical problems.

The following steps are strongly recommended for the improvement of mathematical reading ability:

1. Read the whole problem to find out what it is about.
2. Look for the question or direction that tells what to find or what to do.
3. Look carefully at the problem to determine the facts that are given.
 - a. Discard irrelevant facts.
 - b. Be sure of the meaning of all words, especially mathematical terms.
 - c. Consider any conversions necessary, such as feet to inches.
4. Plan the steps necessary in order to arrive at the answer.
 - a. Are any special computing devices or tools needed, such as a calculator, a steel rule, or a micrometer?
 - b. Are any other facts necessary, such as those found in the Appendix?
 - c. Does a drawing help to relate the facts to each other?
5. Prepare the given information.
 - a. Relate the facts in a word statement.
 - b. Write the numbers, formulas, or symbols necessary.
 - c. Estimate the answer.
6. Use numbers in the mathematical relationship, and compute the necessary information. Round final answers as directed.
7. Verify the answer.
 - a. Check the problem by checking the arithmetic processes.
 - b. Does the final answer agree with the estimate?
 - c. Does the answer sound reasonable for the situation originally described?
 - d. Is the answer in the proper units or terminology?

COPYRIGHT © 1982
BY DELMAR PUBLISHERS INC.

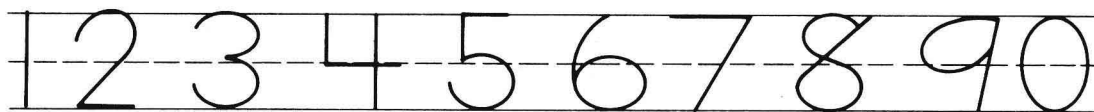
All rights reserved. No part of this work covered by the copyright hereon may be reproduced or used in any form or by any means – graphic, electronic, or mechanical, including photocopying, recording, taping, or information storage and retrieval systems – without written permission of the publisher.

10 9 8 7 6 5 4 3 2 1

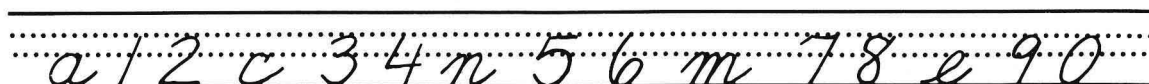
LIBRARY OF CONGRESS CATALOG CARD NUMBER: 81-70393
ISBN: 0-8273-2155-4

Printed in the United States of America
Published Simultaneously in Canada by
Delmar Publishers, A division of
Van Nostrand Reinhold, Ltd.

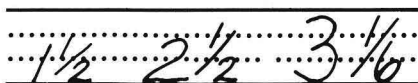
The writing of numbers so they can be easily read is very necessary in any mathematical work. It is recommended that students be given frequent drill and practice in the proper formation of the following figures:



When letters and figures are written together, the figures should be one-half again as high as the one-space letters. For example,



Fractions are written with the figures smaller than the whole numbers; but they must be large enough for easy reading. For example,



SPECIAL NOTE

1. Answers to some questions may vary according to certain values. For example pi (π) may be used as 3.14, $\frac{22}{7}$, or 3.1416.

CONTENTS

To The Instructor	iii
-----------------------------	-----

SECTION 1 COMMON FRACTIONS

Unit 1	Introduction to the Mathematical System	1
Unit 2	Introduction to Common Fractions and Mixed Numbers	1
Unit 3	Addition and Subtraction of Common Fractions and Mixed Numbers	3
Unit 4	Multiplication and Division of Common Fractions and Mixed Numbers	4
Unit 5	Section One Applications to Health Work	6

SECTION 2 DECIMAL FRACTIONS

Unit 6	Introduction to Decimal Fractions	7
Unit 7	Rounding Decimal Numbers and Finding Equivalents	8
Unit 8	Basic Operations with Decimal Fractions	9
Unit 9	Exponents and Scientific Notation	9
Unit 10	Estimation and Significant Digits	11
Unit 11	Section Two Applications to Health Work	12

SECTION 3 METRIC MEASURE

Unit 12	Introduction to Metric Measure	12
Unit 13	Metric Length Measure	13
Unit 14	Metric Area Measure	14
Unit 15	Metric Volume Measure	15
Unit 16	Metric Mass and Temperature Measures	17
Unit 17	Section Three Applications to Health Work	19

SECTION 4 RATIO, PROPORTION, AND PERCENTS

Unit 18	Introduction to Ratio and Proportion	19
Unit 19	Computations with Proportions	20
Unit 20	Introduction to Percents	21
Unit 21	Equations Involving Percents	22
Unit 22	Computations with Percents	23
Unit 23	Section Four Applications to Health Work	24

SECTION 5 SYSTEMS OF MEASURE

Unit 24	The Apothecaries' System of Weight	25
Unit 25	The Apothecaries' System of Volume	27
Unit 26	Household-Apothecaries' Systems of Measure	28
Unit 27	Household-Metric Systems of Measure	29

SECTION 6 ORGANIZING AND REPORTING DATA

Unit 28	Interpreting Charts and Graphs	30
Comprehensive Test		32
Key to Comprehensive Test		36

SECTION 1 COMMON FRACTIONS

UNIT 1 INTRODUCTION TO THE MATHEMATICAL SYSTEM

1.1

- | | | |
|-----------|------------|----------------|
| 1. 14,815 | 5. 217,749 | 9. 97,131 |
| 2. 324 | 6. 2,889 | 10. 48,225 |
| 3. 4,131 | 7. 231,424 | 11. 34,150,991 |
| 4. 52 | 8. 246 | 12. 544 |

1.2

- 1,764; 3,278; 7,420; 11,130; 49,000; 82,722; 296,048; 786,312; 954,560; 1,526,200
- 65; 365; 7,420; 11,130; 49,000; 6,775; 24,835; 446,075; 954,560; 1,526,200
- 7,420; 11,130; 49,000; 954,560; 1,526,200

1.3

- | | | |
|---------------------------------------|----------------------------|---------------------------------|
| 1. $5 < 7$ | 4. $36 + 2 > 40 - 8$ | 7. $16 \times 3 > 42 \div 6$ |
| 2. $13 \times 3 = 3 \times 13$ | 5. $99 - 9 > 90 \div 9$ | 8. $23 \times 5 = 15 + 25 + 75$ |
| 3. $7 \times 2 \times 3 = 7 \times 6$ | 6. $0 \times 8 = 0 \div 8$ | 9. $1,000 - 72 > 459 \times 2$ |

1.4 Two possible solutions are given. Others are correct.

- | | | |
|---------------|--------------------------------|--|
| 1. 10; 20 | 5. 60; 120 | 9. $60 = 5 \times 3 \times 2 \times 2$ |
| 2. 168; 336 | 6. $42 = 7 \times 3 \times 2$ | 10. $125 = 5 \times 5 \times 5$ |
| 3. 36, 72 | 7. $68 = 17 \times 2 \times 2$ | |
| 4. 630; 1,260 | 8. $99 = 11 \times 3 \times 3$ | |

1.5

- | | |
|-----------------|-----------------|
| 1. Answers vary | 3. Answers vary |
| 2. Answers vary | 4. Answers vary |

UNIT 2 INTRODUCTION TO COMMON FRACTIONS AND MIXED NUMBERS

2.1

- | | |
|---|--|
| 1. $\frac{2}{6} = \frac{1}{3}$ | 7. $\frac{3}{2} = \frac{6}{4} = \frac{9}{6} = \frac{12}{8} = \frac{15}{10}$ |
| 2. $\frac{2}{8} = \frac{1}{4}$ | 8. $\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12} = \frac{5}{15}$ |
| 3. $\frac{3}{9} = \frac{1}{3}$ | 9. $\frac{9}{10} = \frac{18}{20} = \frac{27}{30} = \frac{36}{40} = \frac{45}{50}$ |
| 4. $\frac{3}{12} = \frac{1}{4}$ | 10. $\frac{3}{4} = \frac{6}{8} = \frac{9}{12} = \frac{12}{16} = \frac{15}{20}$ |
| 5. $\frac{2}{5} = \frac{4}{10} = \frac{6}{15} = \frac{8}{20} = \frac{10}{25}$ | 11. $\frac{4}{5} = \frac{8}{10} = \frac{12}{15} = \frac{16}{20} = \frac{20}{25}$ |
| 6. $\frac{1}{4} = \frac{2}{8} = \frac{3}{12} = \frac{4}{16} = \frac{5}{20}$ | 12. $\frac{7}{10} = \frac{14}{20} = \frac{21}{30} = \frac{28}{40} = \frac{35}{50}$ |

2.2

- | | | |
|-----------|-----------|---------|
| 1. = | 9. $\neq$ | 17. 10 |
| 2. $\neq$ | 10. = | 18. 3 |
| 3. = | 11. = | 19. 100 |
| 4. = | 12. = | 20. 8 |
| 5. $\neq$ | 13. 6 | 21. 200 |
| 6. $\neq$ | 14. 1 | 22. 10 |
| 7. = | 15. 20 | 23. 3 |
| 8. $\neq$ | 16. 8 | |

2 Instructor's Guide

2.3

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

9. $\frac{1}{4}$

16. $\frac{1}{2}$

23. $\frac{5}{7}$

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

10. $\frac{3}{4}$

17. $\frac{2}{3}$

24. $\frac{3}{7}$

3. $\frac{1}{4}$

11. $\frac{1}{3}$

18. $\frac{7}{10}$

25. $\frac{6}{7}$

4. 1

12. $\frac{1}{4}$

19. $\frac{3}{10}$

26. $\frac{9}{7}$

5. $\frac{1}{2}$

13. $\frac{3}{10}$

20. lowest terms

27. $\frac{11}{13}$

6. $\frac{1}{3}$

14. $\frac{2}{5}$

21. $\frac{1}{3}$

28. $\frac{1}{31}$

7. $\frac{1}{3}$

15. lowest terms

22. $\frac{3}{4}$

29. $\frac{33}{52}$

8. $\frac{1}{7}$

2.4

1. A. $\frac{3}{5}$

F. $\frac{10}{10}$

2. A. $\frac{4}{6}$

E. $\frac{12}{6}$

B. $\frac{6}{5}$

G. $\frac{14}{10}$

B. $\frac{7}{6}$

F. $\frac{13}{6}$

C. $\frac{9}{5}$

H. $\frac{18}{10}$

C. $\frac{9}{6}$

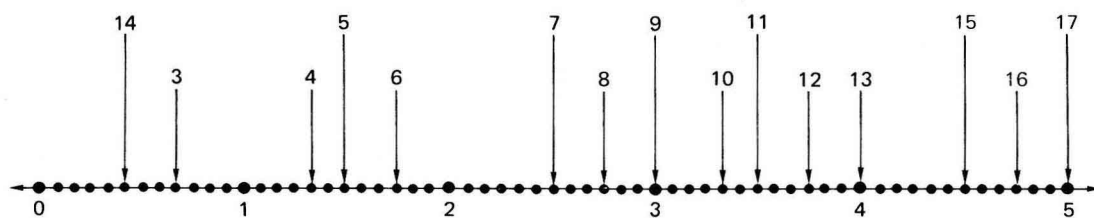
G. $\frac{16}{6}$

D. $\frac{12}{5}$

I. $\frac{20}{10}$

D. $\frac{11}{6}$

E. $\frac{13}{5}$



2.5

1. $\frac{2}{3} < \frac{5}{6}$

7. $\frac{8}{2} = \frac{16}{4}$

13. $\frac{2}{3}$

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

2. $\frac{1}{2} > \frac{3}{8}$

8. $\frac{2}{3} < \frac{3}{4}$

14. $\frac{7}{8}$

20. $\frac{2}{8}$

3. $\frac{2}{5} < \frac{5}{10}$

9. $\frac{4}{10} = \frac{2}{5}$

15. $\frac{9}{12}$

21. $\frac{2}{16}$

4. $\frac{3}{4} > \frac{5}{12}$

10. $\frac{1}{16} > \frac{1}{32}$

16. $\frac{4}{5}$

22. $\frac{8}{7}$

5. $\frac{1}{5} = \frac{2}{10}$

11. $\frac{1}{8} < \frac{1}{7}$

17. $\frac{2}{3}$

23. $\frac{5}{9}$

6. $\frac{9}{10} > \frac{9}{11}$

12. $7 = \frac{7}{1}$

18. $\frac{4}{5}$

24. $\frac{3}{2}$

2.6

- | | | | |
|--------------------|-----------------------|----------------------|----------------------|
| 1. $1\frac{2}{3}$ | 9. $4\frac{1}{3}$ | 17. $\frac{11}{4}$ | 24. $\frac{121}{4}$ |
| 2. $2\frac{1}{3}$ | 10. $2\frac{4}{5}$ | 18. $\frac{51}{10}$ | 25. $\frac{100}{3}$ |
| 3. $2\frac{1}{4}$ | 11. $1\frac{5}{16}$ | 19. $\frac{17}{2}$ | 26. $\frac{454}{5}$ |
| 4. $5\frac{1}{2}$ | 12. 6 | 20. $\frac{11}{3}$ | 27. $\frac{219}{10}$ |
| 5. 2 | 13. $1\frac{21}{100}$ | 21. $\frac{41}{6}$ | 28. $\frac{323}{32}$ |
| 6. $1\frac{4}{7}$ | 14. $1\frac{1}{2}$ | 22. $\frac{89}{8}$ | 29. $\frac{201}{4}$ |
| 7. $1\frac{9}{10}$ | 15. $3\frac{1}{4}$ | 23. $\frac{100}{11}$ | 30. $\frac{409}{16}$ |
| 8. $3\frac{1}{5}$ | 16. $\frac{4}{3}$ | | |

2.7

- | | |
|---------------------|---|
| 1. $\frac{1}{9}$ | 3. The nurse spending $\frac{1}{3}$ of every day. |
| 2. $\frac{27}{325}$ | 4. Baby A |

UNIT 3 ADDITION AND SUBTRACTION OF COMMON FRACTIONS AND MIXED NUMBERS

3.1

- | | | | |
|-------------------|-------------------|------|--------------------|
| 1. $\frac{4}{7}$ | 4. $1\frac{2}{5}$ | 7. 1 | 9. $\frac{3}{4}$ |
| 2. 1 | 5. $2\frac{2}{3}$ | 8. 0 | 10. $1\frac{1}{2}$ |
| 3. $1\frac{3}{8}$ | 6. $\frac{1}{8}$ | | |

3.2

- | | | | |
|-------|-------|--------|--------|
| 1. 24 | 4. 10 | 7. 32 | 9. 48 |
| 2. 6 | 5. 36 | 8. 100 | 10. 32 |
| 3. 15 | 6. 16 | | |

3.3

- | | | | |
|-------------------|-------------------|--------------------|--------------------|
| 1. $\frac{5}{8}$ | 5. $2\frac{1}{6}$ | 9. $\frac{1}{10}$ | 13. $\frac{3}{4}$ |
| 2. $\frac{1}{4}$ | 6. $2\frac{1}{4}$ | 10. $\frac{5}{6}$ | 14. $1\frac{1}{6}$ |
| 3. $\frac{7}{16}$ | 7. $\frac{1}{8}$ | 11. $1\frac{1}{2}$ | 15. $\frac{3}{4}$ |
| 4. $1\frac{1}{8}$ | 8. $\frac{1}{14}$ | 12. 0 | |

4 Instructor's Guide

3.4

1. 1

4. $\frac{8}{25}$

7. $3\frac{3}{5}$

9. $2\frac{5}{6}$

2. $\frac{17}{32}$

5. $1\frac{3}{8}$

8. $\frac{11}{16}$

10. $2\frac{5}{8}$

3. $1\frac{1}{20}$

6. $\frac{15}{16}$

3.5

1. $14\frac{3}{5}$

6. $29\frac{1}{2}$

11. $1\frac{43}{60}$

16. $22\frac{11}{12}$

2. $9\frac{1}{12}$

7. $11\frac{2}{9}$

12. $6\frac{5}{8}$

17. $8\frac{3}{4}$

3. $7\frac{1}{4}$

8. $7\frac{5}{32}$

13. $7\frac{1}{2}$

18. $41\frac{1}{100}$

4. $20\frac{5}{6}$

9. $15\frac{1}{5}$

14. $15\frac{27}{100}$

19. $11\frac{2}{3}$

5. $32\frac{5}{8}$

10. $18\frac{2}{15}$

15. $2\frac{3}{4}$

20. $8\frac{4}{5}$

3.6

1. $\frac{1}{2} < \frac{3}{4}$

7. $\frac{4}{5}$

13. $3\frac{1}{2}$

18. $\frac{26}{4}$

2. $\frac{2}{3} < \frac{5}{6}$

8. $\frac{4}{6}$

14. $\frac{10}{5}$

19. $\frac{3}{4}$

3. $\frac{1}{3} > \frac{1}{4}$

9. $\frac{3}{2}$

15. $\frac{2}{5}$

20. $\frac{11}{2}$

4. $\frac{2}{5} < \frac{3}{6}$

10. $\frac{9}{3}$

16. $\frac{2}{3}$

21. $6\frac{1}{3}$

5. $\frac{3}{4} > \frac{2}{5}$

11. $\frac{3}{4}$

17. $2\frac{1}{2}$

22. $\frac{11}{2}$

6. $\frac{1}{10} = \frac{10}{100}$

12. $\frac{4}{5}$

3.7

1. $1\frac{2}{15}$ ounces

4. $3\frac{1}{3}$ pints

2. $4\frac{1}{6}$ grains

5. $\frac{23}{160}$ grain

3. $3\frac{3}{4}$ ounces

UNIT 4 MULTIPLICATION AND DIVISION OF COMMON FRACTIONS AND MIXED NUMBERS

4.1

1. 25

3. 10

5. $\frac{1}{6}$

7. $\frac{3}{28}$

2. 15

4. $\frac{1}{6}$

6. $\frac{3}{10}$

8. $\frac{2}{15}$

9. $\frac{2}{3}$ 15. $\frac{4}{5}$ 21. $\frac{5}{9}$ 26. 0
10. $\frac{1}{4}$ 16. $\frac{1}{2}$ 22. $2\frac{2}{5}$ 27. $\frac{1}{10}$
11. $\frac{3}{10}$ 17. $\frac{3}{16}$ 23. 1 28. $\frac{3}{32}$
12. $\frac{1}{12}$ 18. 4 24. $\frac{2}{5}$ 29. $\frac{1}{6}$
13. $\frac{1}{40}$ 19. $\frac{1}{3}$ 25. $\frac{7}{10}$ 30. $\frac{7}{15}$
14. 1 20. $\frac{8}{63}$
- 4.2**
1. $\frac{8}{15}$ 6. $16\frac{1}{3}$ 11. $4\frac{1}{8}$ 16. $3\frac{37}{50}$
2. $\frac{13}{24}$ 7. $23\frac{5}{6}$ 12. $6\frac{15}{32}$ 17. 1
3. $2\frac{5}{6}$ 8. $15\frac{5}{16}$ 13. $33\frac{1}{3}$ 18. 8
4. $1\frac{1}{8}$ 9. $17\frac{1}{15}$ 14. $12\frac{5}{18}$ 19. $57\frac{3}{4}$
5. $3\frac{2}{3}$ 10. $8\frac{4}{5}$ 15. 0 20. 0
- 4.3**
1. 6 7. a. 4 9. a. 9
2. 20 b. 2 b. $4\frac{1}{2}$
3. 16 8. a. 8 c. 3
4. 20 b. 4 10. a. 3
5. 24 c. 2 b. $1\frac{1}{2}$
6. 6 c. 1
- 4.4**
1. $\frac{1}{7}$ 4. $\frac{9}{5}$ 7. $\frac{4}{25}$ 9. $\frac{7}{60}$
2. $\frac{3}{1}$ 5. $\frac{1}{1}$ 8. $\frac{44}{76}$ 10. No solution
3. $\frac{1}{22}$ 6. $\frac{d}{c}$
- 4.5**
1. $\frac{5}{12}$ 5. $\frac{21}{40}$ 9. 2 13. $1\frac{1}{2}$
2. $1\frac{1}{3}$ 6. $6\frac{6}{7}$ 10. 4 14. $1\frac{1}{5}$
3. $\frac{2}{3}$ 7. $\frac{4}{5}$ 11. 6 15. 0
4. 25 8. 1 12. $\frac{3}{4}$

6 Instructor's Guide

4.6

- | | | | |
|---------------------|---------------------|---------------------|--------------------|
| 1. $\frac{2}{3}$ | 5. $1\frac{7}{9}$ | 9. $1\frac{37}{68}$ | 13. $1\frac{4}{9}$ |
| 2. $\frac{15}{19}$ | 6. $1\frac{13}{20}$ | 10. $\frac{1}{210}$ | 14. $\frac{3}{25}$ |
| 3. $2\frac{16}{25}$ | 7. 5 | 11. $18\frac{1}{2}$ | 15. 0 |
| 4. $2\frac{1}{4}$ | 8. 30 | 12. 6 | |

4.7

- | | |
|--------------------------|----------------------------|
| 1. 4,797 | 4. 4 |
| 2. 10 | 5. $233\frac{1}{3}$ ounces |
| 3. $3\frac{4}{5}$ ounces | |

UNIT 5 SECTION ONE APPLICATIONS TO HEALTH WORK

5.1

- | | |
|--------------------------|---|
| 1. a. $\frac{1}{3}$ | 11. a. $15\frac{5}{16}$ ounces |
| b. 3 | b. 7 ounces |
| c. $1\frac{1}{2}$ grains | c. $2\frac{11}{12}$ ounces |
| 2. $1\frac{1}{2}$ | d. $75\frac{5}{6}$ |
| 3. $\frac{23}{52}$ | 12. 3 |
| 4. a. $\frac{1}{20}$ | 13. a. $\frac{3}{10}$ ounce |
| b. $\frac{1}{30}$ | b. $1\frac{7}{8}$ ounce |
| c. $\frac{1}{60}$ | 14. \$3,555,000 |
| d. $\frac{9}{10}$ | 15. No; The combined contents would fill $1\frac{1}{20}$ file cabinets. |
| 5. 11 | 16. $1\frac{1}{2}$ ounces |
| 6. 10 | 17. The patient receiving $\frac{1}{2}$ tablet. |
| 7. 32,200 | 18. a. $11\frac{1}{9}$ grams |
| 8. 17 | b. $44\frac{4}{9}$ grams |
| 9. a. $\frac{2}{3}$ | c. $2\frac{2}{9}$ grams |
| b. $\frac{1}{3}$ | d. $5\frac{1}{9}$ grams |
| 10. a. 12 grams | 19. a. $\frac{2}{15}$ ounce |
| b. $\frac{5}{12}$ | b. $\frac{1}{45}$ ounce |
| c. $\frac{7}{12}$ | 20. a. 2 |
| | b. 50 |

SECTION 2 DECIMAL FRACTIONS

UNIT 6 INTRODUCTION TO DECIMAL FRACTIONS

6.1

1. 0.3
2. 0.21
3. 0.137
4. 0.1571
5. 0.009
6. 0.07
7. 0.0031
8. 0.001
9. 0.0007
10. 0.080
11. 4.2
12. 5.13
13. 6.21
14. 23.137
15. 42.8137
16. 11.017
17. 10.01
18. 0.0107
19. 15.0003
20. $3 + \frac{4}{10} + \frac{6}{100} + \frac{2}{1,000} =$
 $3 + \frac{400}{1,000} + \frac{60}{1,000} + \frac{2}{1,000} =$
 $3 \frac{462}{1,000}$ or $3 \frac{231}{500}$
21. $0 + \frac{9}{10} + \frac{8}{100} + \frac{1}{1,000} =$
 $0 + \frac{900}{1,000} + \frac{80}{1,000} + \frac{1}{1,000} =$
 $\frac{981}{1,000}$

22. $17 + \frac{8}{10} + \frac{0}{100} + \frac{3}{1,000} =$
 $17 + \frac{800}{1,000} + \frac{0}{1,000} + \frac{3}{1,000} =$
 $17 \frac{803}{1,000}$
23. $9 + \frac{0}{10} + \frac{1}{100} + \frac{2}{1,000} =$
 $9 + \frac{0}{1,000} + \frac{10}{1,000} + \frac{2}{1,000} =$
 $9 \frac{12}{1,000}$ or $9 \frac{3}{250}$
24. $5 \frac{9}{10}$
25. $7 \frac{31}{100}$
26. $8 \frac{90}{100}$
27. $2 \frac{5}{10}$
28. $42 \frac{657}{1,000}$
29. $14 \frac{57}{1,000}$
30. $92 \frac{705}{1,000}$
31. $1 \frac{57}{10,000}$
32. $17 \frac{570}{100,000}$
33. $111 \frac{72}{100,000}$
34. $9 \frac{7,005}{10,000}$
35. $15 \frac{82,090}{100,000}$

6.2

- | | | | |
|------|------|-------|-------|
| 1. < | 5. > | 9. < | 13. < |
| 2. = | 6. > | 10. > | 14. > |
| 3. < | 7. < | 11. < | 15. < |
| 4. > | 8. < | 12. = | |

6.3

1. The second patient
2. 0.4; 0.6
3. 2.8 pints
4. 0.4
5. Veterinarians

UNIT 7 ROUNDING DECIMAL FRACTIONS AND FINDING EQUIVALENTS

7.1

1. 2.893	16. 3.14	31. 4	46. 1,610
2. 74.519	17. 74.28	32. 0	47. 470
3. 0.433	18. 0.37	33. 30	48. 500
4. 0.019	19. 17.00	34. 44	49. 2,110
5. 100.026	20. 322.75	35. 317	50. 14,010
6. 35.055	21. 5.7	36. 9	51. 6,200
7. 0.251	22. 289.9	37. 40	52. 1,800
8. 1.217	23. 0.7	38. 411	53. 3,900
9. 73.605	24. 3.5	39. 1	54. 1,200
10. 432.922	25. 706.5	40. 1	55. 15,700
11. 16.32	26. 23.1	41. 270	56. 3,100
12. 0.90	27. 0.2	42. 150	57. 6,800
13. 4.72	28. 29.1	43. 310	58. 9,000
14. 0.09	29. 0.0	44. 1,870	59. 2,000
15. 0.01	30. 1,323.0	45. 30	60. 24,000

7.2

1. 8;0.8	11. 0.6	21. 0.5	31. 0.6875
2. 26;0.26	12. 0.875	22. 0.625	32. 0.225
3. 75;0.75	13. 0.015	23. 0.9	33. 1.625
4. 68;0.68	14. 2.5	24. 0.52	34. 1.21
5. 5;0.05	15. 0.342	25. 2.75	35. 0.85
6. 375;0.375	16. 0.45	26. 0.44	36. 0.04
7. 85;0.85	17. 1.28	27. 3.5	37. 0.46
8. 0;0	18. 0.4375	28. 0.2625	38. 0.09375
9. 5,625;0.5625	19. 12.5	29. 2.2	39. 0
10. 15,625;0.15625	20. 0.1875	30. 0.46	40. 0.015625

7.3

1. $2.33\ldots$ or $2.\overline{3}$	16. $9.\overline{7231}; 4$
2. $0.5833\ldots$ or $0.58\overline{3}$	17. $32.\overline{608}; 3$
3. $0.166\ldots$ or $0.1\overline{6}$	18. $1.24\overline{3}; 3$
4. $0.\overline{18}$ or $0.1818\ldots$	19. $0.\overline{5}; 1$
5. $1.66\ldots$ or $1.\overline{6}$	20. $0.58\overline{3}; 1$
6. $0.14285\overline{7}$ or $0.142857142857\ldots$	21. $0.1818\ldots; 2$
7. $0.55\ldots$ or $0.\overline{5}$	22. $41.2899\ldots; 1$
8. $1.33\ldots$ or $1.\overline{3}$	23. $4.2727\ldots; 2$
9. $0.8461\overline{53}$ or $0.846153846153\ldots$	24. $1.142857142857\ldots; 6$
10. $1.5833\ldots$ or $1.58\overline{3}$	25. $15.00\ldots; 1$
11. $0.55\ldots; 1$	26. $0.1\overline{6}; 1$
12. $5.744\ldots; 1$	27. $0.4\overline{5}; 2$
13. $0.0202\ldots; 2$	28. $0.4285\overline{71}; 6$
14. $0.004004\ldots; 3$	29. $0.0769\overline{23}; 6$
15. $0.037037\ldots; 3$	30. $27.\overline{62}; 2$

7.4

- | | |
|--|---|
| 1. 4.689 grams | 3. No |
| 2. 43.5 centimetres;
44.1 centimetres;
42.0 centimetres;
46.7 centimetres | 4. a. $566.\overline{6}$ millilitres
b. $1\ 133.\overline{3}$ millilitres
c. 566.67 millilitres |

UNIT 8 BASIC OPERATIONS WITH DECIMAL FRACTIONS

8.1

- | | | | |
|------------|------------|-------------|-------------|
| 1. 0.71 | 9. 0.9 | 17. 4.58 | 25. 19.92 |
| 2. 17.01 | 10. 1.72 | 18. 3.75 | 26. 0.03 |
| 3. 38.62 | 11. 34.81 | 19. 26.34 | 27. 107.86 |
| 4. 23.698 | 12. 9.722 | 20. 10.258 | 28. 2.628 |
| 5. 5.766 | 13. 3.703 | 21. 25.824 | 29. 1.012 |
| 6. 58.98 | 14. 1.424 | 22. 21.874 | 30. 0.009 |
| 7. 49.333 | 15. 15.197 | 23. 150.912 | 31. 188.023 |
| 8. 17.4409 | 16. 0.211 | 24. 58.055 | 32. 9.9988 |

8.2

- | | | | |
|----------|-----------|--------------|---------------|
| 1. 14.4 | 5. 16.12 | 9. 33.552 | 13. 1.57304 |
| 2. 1.44 | 6. 1.612 | 10. 0.000056 | 14. 0.0000378 |
| 3. 0.144 | 7. 0.1612 | 11. 37.695 | 15. 62.7 |
| 4. 161.2 | 8. 9.36 | 12. 480.142 | |

8.3

- | | | | |
|-----------|------------|-------------|----------------|
| 1. 7.3 | 10. 0.004 | 19. 0.0004 | 27. 19.66 |
| 2. 0.85 | 11. 155 | 20. 5,351.3 | 28. 17.92 |
| 3. 0.102 | 12. 441 | 21. 500.1 | 29. 0.03 |
| 4. 2.03 | 13. 205.1 | 22. 80.02 | 30. 0.15 |
| 5. 0.305 | 14. 2.01 | 23. 30.15 | 31. 2.18 |
| 6. 0.0203 | 15. 20 | 24. 70,000 | 32. 57,333.333 |
| 7. 2.001 | 16. 600 | 25. 216,000 | 33. 28,584 |
| 8. 0.03 | 17. 60.3 | 26. 12.53 | 34. 164.248 |
| 9. 0.03 | 18. 20.300 | | |

8.4

- | | |
|----------------------|-----------------------|
| 1. 3.875 millilitres | 6. \$141.33 |
| 2. 3.375 millilitres | 7. a. 4.868 kilograms |
| 3. 10 | b. 0.162 kilogram |
| 4. 18.75 millilitres | c. 86.826 kilograms |
| 5. \$19.12 | |

UNIT 9 EXPONENTS AND SCIENTIFIC NOTATION

9.1

- | | | | |
|-----------|----------------------|----------------------|-------------------------|
| 1. 4^2 | 12. 4 | 22. $\frac{1}{7}$ | 28. $\frac{1}{10^{10}}$ |
| 2. 2^5 | 13. $<$ | 23. $\frac{1}{4^5}$ | 29. 3^{-5} |
| 3. 10^4 | 14. $<$ | 24. $\frac{1}{10^4}$ | 30. 10^{-1} |
| 4. 9^4 | 15. 4 | 25. $\frac{1}{8^2}$ | 31. 2^{-4} |
| 5. 7^3 | 16. 64 | 26. $\frac{1}{5^3}$ | 32. 3^{-2} |
| 6. 5 | 17. $=$ | 27. $\frac{1}{9^6}$ | 33. 10^{-5} |
| 7. 3 | 18. 3 | | 34. 9^{-3} |
| 8. 1 | 19. 0 | | 35. $1,000^{-4}$ |
| 9. 9 | 20. $=$ | | 36. 3^{-1} |
| 10. 100 | 21. $\frac{1}{10^3}$ | | |
| 11. 4 | | | |

10 Instructor's Guide

9.2

- | | | |
|----------------------|-----------------|------------------|
| 1. 10^3 | 10. 0.1^{-3} | 18. 2^{-1} |
| 2. 4^6 | 11. 3^2 | 19. 10^2 |
| 3. 6^{-2} | 12. 10^0 or 1 | 20. 0.6^0 or 1 |
| 4. 2^0 or 1 | 13. 2^1 | 21. 10^4 |
| 5. 4^3 | 14. 5^{-2} | 22. 10^3 |
| 6. 10^{-1} | 15. 0.7^1 | 23. 4^8 |
| 7. 0.5^3 | 16. 8^0 or 1 | 24. 2^{10} |
| 8. $(\frac{1}{2})^5$ | 17. 10^3 | 25. 0.7^0 or 1 |
| 9. 0.3^0 or 1 | | |

9.3

- | | | |
|-------------------------|---------------------------|---------------------------|
| 1. 2.7 | 11. 3.5×10^0 | 21. 3.85×10^0 |
| 2. 0.38 | 12. 6.2×10^0 | 22. 5.79×10^0 |
| 3. 145 | 13. 7.35×10^{-1} | 23. 8,920 |
| 4. 1,000 | 14. 3.7 | 24. 0.00615 |
| 5. 37 | 15. 5,314,000 | 25. 2.73×10^0 |
| 6. 0.00063 | 16. 0.0617 | 26. 5.28×10^5 |
| 7. 110,000 | 17. 4.18×10^1 | 27. 408,000 |
| 8. 3.42×10^2 | 18. 1.0×10^3 | 28. 0.0004 |
| 9. 7.2×10^{-2} | 19. 1.73×10^{-1} | 29. 4.5×10^{-1} |
| 10. 2.0×10^7 | 20. 5.42×10^3 | 30. 3.42×10^{-3} |

9.4

- $20 \times 10^5 = 2.0 \times 10^6 = 2,000,000$
- $56 \times 10^2 = 5.6 \times 10^3 = 5,600$
- $9 \times 10^2 \times 7 \times 10^{-2} = 63 \times 10^0 = 6.3 \times 10^1 = 63$
- $24 \times 10^2 = 2.4 \times 10^3 = 2,400$
- $6 \times 10^{-3} = 0.006$
- $8 \times 10^{-2} \times 3 \times 10^{-3} = 24 \times 10^{-5} = 2.4 \times 10^{-4} = 0.00024$
- $72 \times 10^2 = 7.2 \times 10^3 = 7,200$
- $6 \times 10^4 \times 8 \times 10^{-6} = 48 \times 10^{-2} = 4.8 \times 10^{-1} = 0.48$

9.5

- 3.0×10^0 to 1.0×10^3 micrometres
 - 3.0×10^{-6} to 1.0×10^{-3} metre
- 0.000 4 to 0.000 02 micrometre
 - 4.0×10^{-4} to 2.0×10^{-5} micrometre
- Width: 3.0×10^0 to 5.0×10^0 micrometres
Length: 5.0×10^0 to 1.0×10^1 micrometres
 - Width: 3.0×10^{-6} to 5.0×10^{-6} metre
0.000 003 to 0.000 005 metre
Length: 5.0×10^{-6} to 1.0×10^{-5} metre
0.000 005 to 0.000 01 metre
- 0.001 micrometre = 1.0×10^{-3} micrometre
 - $0.001 \div 0.000 02 = 50$
- 2.56×10^5 cells

UNIT 10 ESTIMATION AND SIGNIFICANT DIGITS

10.1

1. $7 \times 10 = 70$
2. $5 \times 20 = 100$
3. $1 \times 4 = 4$
4. $25 \times 40 = 1,000$
5. $380 \times 20 = 7,600$
6. $100 \times 1 = 100$
7. $1 \times 12 = 12$
8. $65 \times 11 = 715$
9. $250 \times 30 = 7,500$
10. $1 \times 36 = 36$
11. $3.2 \times 15 = 48$
12. $0.2 \times 40 = 8$
13. $0.1 \times 320 = 32$
14. $0.3 \times 17 = 5.1$
15. $2.2 \times 4 = 8.8$
16. $42.79 \times 3 = 128.37$
17. $19.21 \times 10 = 192.1$
18. $713.04 \times 100 = 71,304$
19. $47.08 \times 5 = 235.4$
20. $0.61 \times 60 = 36.6$
21. $32 \div 16 = 2$
22. $192 \div 64 = 3$
23. $15 \div 5 = 3$
24. $81 \div 9 = 9$
25. $453 \div 1 = 453$
26. $400 \div 20 = 20$
27. $54 \div 3 = 18$
28. $44 \div 11 = 4$
29. $1,024 \div 4 = 256$
30. $88 \div 2 = 44$
31. $31 \div 6.2 = 5$
32. $52 \div 2.6 = 20$
33. $66 \div 2.2 = 30$
34. $77 \div 1.1 = 70$
35. $500 \div 2.5 = 200$
36. $177 \div 10.00 = 17.7$
37. $147 \div 0.07 = 2,100$
38. $6 \div 3.00 = 2$
39. $15 \div 0.05 = 300$
40. $2,175 \div 0.05 = 43,500$

10.2

- | | | | |
|------|-----------|------------|---------------|
| 1. 3 | 9. 3 | 17. 31.7 | 24. 90 |
| 2. 5 | 10. 3 | 18. 2.00 | 25. 0.4 |
| 3. 2 | 11. 5,290 | 19. 309 | 26. 0.0005 |
| 4. 3 | 12. 3.78 | 20. 1.44 | 27. 3 |
| 5. 4 | 13. 7,970 | 21. 200 | 28. 0.0004 |
| 6. 3 | 14. 13.5 | 22. 0.08 | 29. 5,000,000 |
| 7. 3 | 15. 16.8 | 23. 40,000 | 30. 0.7 |
| 8. 5 | 16. 14.6 | | |

10.3

1. $3.07 + 4.28 + 9.77 = 17.12$
2. $1.897 + 0.913 = 2.810$
3. $89.7 + 14.0 + 9.3 = 113.0$
4. $325.7 + 141.7 + 1.0 = 468.4$
5. $29.57 - 13.84 = 15.73$
6. $43 - 27 = 16$
7. $18.2 - 7.6 = 10.6$
8. $1.739 - 0.706 = 1.033$
9. $30 \times 0.05 = 2$ (rounded)
10. $71.32 \times 4.814 = 343.3$ (rounded)
11. $0.71 \times 0.014 = 0.0099$ (rounded)
12. $15.0 \times 7.53 = 113$ (rounded)
13. $0.420 \div 179 = 0.00235$ (rounded)
14. $0.1 \div 3,000 = 0.00003$ (rounded)
15. $1.54 \div 71.9 = 0.0214$ (rounded)
16. $0.0004 \div 0.002 = 0.2$

10.4

1. a. Researcher A: 0.001 6 micrometre
Researcher B: 0.001 5 micrometre
Researcher C: 0.001 5 micrometre
Researcher D: 0.001 5 micrometre
b. 0.001 5 micrometre
2. a. 27.3 grams
b. 0.000 000 545 gram
c. 0.013 6 gram
3. 12.342 6 grams
4. Approximately 50