

# Part I Introduction

## Chapter 2

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### Fractions and Decimals

#### **Overview**

Correct dosage calculations play a large role in ensuring that medications are administered accurately and safely. Pharmacy technicians must learn fractions and decimals to be able to calculate the dosage of drugs by weight and measures of volume. The pharmacy technician must also be able to convert from fractions to decimals as well as from decimals to fractions. Fractions and decimals provide a way to express the relationship of parts to a whole. Fractions measure a portion or part of a whole amount. The decimal system provides another way to represent whole numbers and their fractional parts. Pharmacy technicians use fractions and decimals in their daily work and must be able to work with decimals and fractions proficiently.

#### **Glossary**

**common fraction** A fraction in which both the numerator and denominator are whole numbers as opposed to fractions themselves.

**complex fraction** A fraction in which the numerator or the denominator, or both, may be a whole number, proper fraction, or mixed number.

**decimal fraction** A fraction with a denominator of 10, 100, 1000, or any multiple or power of 10; also known as a decimal.

**denominator** The number the whole is divided into.

**dividend** The number that is being divided.

**divisor** The number performing the division.

**fraction** An expression of division with a number that is the portion or part of a whole.

**improper fraction** A fraction with the numerator larger than or equal to the denominator.

**mixed fraction** A fraction consisting of a whole number and a proper fraction combined.

**multiplicand** A number to be multiplied by another.

**multiplier** A number by which another is multiplied.

**numerator** The portion of the whole being considered.

**proper fraction** A fraction with the numerator smaller than the denominator.

**quotient** The answer to a division problem.

## **Outline**

Overview

Fractions

Distinguishing Types of Fractions

Comparing Fractions

Converting Improper Fractions to Mixed or Whole Numbers

Converting Mixed or Whole Numbers to Improper Fractions

Adding Fractions

Subtracting Fractions

Multiplying Fractions

Dividing Fractions

Finding the Least Common Denominator

Reducing Fractions to the Lowest Terms

Decimals

Converting Fractions to Decimals and Decimals to Fractions

Adding Decimals

Subtracting Decimals

Multiplying Decimals

Dividing Decimals

Rounding Decimals

### **Objectives**

*Upon completion of this chapter, the student should be able to:*

1. Distinguish the various types of fractions.
2. Compare fractions.
3. Add, subtract, multiply, and divide fractions accurately.
4. Recognize the format of decimals.
5. Convert fractions to mixed numbers and decimals.
6. Add, subtract, multiply, and divide decimals accurately.
7. Round decimals to the nearest tenth, hundredth, and thousandth.

### **Teaching Strategies**

Provide examples of various types of fractions and compare them when appropriate.

Use flash cards to help students develop a solid understanding of fractions and decimals.

Offer exercises in adding, subtracting, multiplying, and dividing fractions and decimals.

Also, provide exercises in the conversion of fractions, mixed numbers, and decimals.

Use the PowerPoint presentation to provide visual representations of calculations and conversions.

## **ANSWERS TO STOP AND REVIEW EXERCISES**

### **COMMON FRACTIONS – PAGE 35**

- |       |                    |
|-------|--------------------|
| 1. 80 | 7. c               |
| 2. 5  | 8. a               |
| 3. 60 | 9. 3               |
| 4. 25 | 10. 1              |
| 5. 9  | 11. $6\frac{1}{2}$ |
| 6. 82 |                    |

12.  $1\frac{4}{5}$

13.  $4\frac{13}{15}$

14. 25

15. 2

16.  $10\frac{1}{3}$

17.  $\frac{120}{18} = \frac{20}{3}$

18.  $\frac{370}{19}$

19.  $\frac{51}{10}$

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

21.  $\frac{35}{9}$

22.  $\frac{452}{8} = \frac{113}{2}$

23.  $\frac{452}{3}$

24.  $\frac{1156}{6} = \frac{578}{3}$

**LOWEST COMMON DENOMINATOR AND REDUCING FRACTIONS – PAGE 39**

1. 12

2. 6

3. 60

4. 20

5. 16

6. 12

7. 24

8. 16

9. 8

10. 4

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

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

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

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

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

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

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

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

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

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

## ADDING AND SUBTRACTING FRACTIONS – PAGES 40–41

1.  $\frac{13}{24}$

2.  $\frac{71}{72}$

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

4.  $1\frac{17}{24}$

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

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

7.  $3\frac{8}{11}$

8.  $\frac{13}{42}$

9.  $\frac{71}{105}$

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

11.  $\frac{47}{60}$

12.  $1\frac{11}{18}$

13.  $2\frac{7}{10}$

14.  $\frac{13}{15}$

15. 6

16.  $3\frac{1}{5}$

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

18.  $3\frac{1}{3}$

19.  $5\frac{1}{2}$

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

21.  $6\frac{4}{7}$

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

23.  $\frac{7}{12}$

24.  $5\frac{1}{8}$

25.  $2\frac{1}{8}$

26.  $11\frac{2}{5}$

27.  $13\frac{4}{7}$

28.  $4\frac{5}{6}$

29.  $7\frac{2}{9}$

30.  $\frac{7}{12}$

## MULTIPLYING FRACTIONS – PAGES 41–42

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

2.  $\frac{8}{35}$

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

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

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

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

7.  $\frac{25}{72}$

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

9.  $1\frac{1}{3}$

10.  $\frac{14}{15}$

11. 2

12.  $14\frac{3}{10}$

13.  $27\frac{1}{12}$

14.  $1\frac{1}{2}$

15.  $\frac{21}{128}$

16.  $\frac{48}{125}$

17.  $\frac{49}{108}$

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

19.  $1\frac{17}{88}$

20.  $\frac{35}{96}$

## DIVIDING FRACTIONS – PAGES 42–43

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

2.  $\frac{20}{33}$

3.  $\frac{8}{9}$

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

5.  $2\frac{1}{7}$

6.  $1\frac{5}{9}$

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

8.  $\frac{90}{161}$

9.  $2\frac{1}{7}$

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

11.  $2\frac{106}{171}$

12.  $4\frac{5}{7}$

13.  $\frac{4}{42}$

14. 16

15.  $1\frac{1}{8}$

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

**CONVERTING FRACTIONS AND DECIMALS – PAGES 45–46**

1. 0.5

2. 0.4

3. 0.17 (rounded)

4. 0.625

5. 0.13 (rounded)

6. 0.006 (rounded)

7. 0.015

8. 0.83 (rounded)

9. 0.002

10. 0.0003 (rounded)

11.  $\frac{1}{200}$

12.  $\frac{9}{1000}$

13.  $\frac{33}{10,000}$

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

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

16.  $\frac{1}{5000}$

17.  $\frac{3}{40}$

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

19.  $\frac{21}{25}$

20.  $2\frac{3}{4}$

**ADDING AND SUBTRACTING DECIMALS – PAGES 47–48**

1. 14.24

2. 186.09

3. 17.469

4. 77.224

5. 4.86

6. 5.459

7. 0.705

8. 8.033

9. 53.55

10. 17.135

11. 7.8

12. 15.6

13. 4.62

14. 12.023

15. 8.977

16. 16.93

## MULTIPLYING DECIMALS – PAGE 49

- |           |             |
|-----------|-------------|
| 1. 83.42  | 7. 0.00027  |
| 2. 3.43   | 8. 0.2125   |
| 3. 20.724 | 9. 90.72    |
| 4. 0.5648 | 10. 1.36    |
| 5. 0.539  | 11. 0.0591  |
| 6. 0.0492 | 12. 0.38535 |

## DIVIDING DECIMALS – PAGES 50–51

- |          |             |
|----------|-------------|
| 1. 4.43  | 11. 0.3906  |
| 2. 61.33 | 12. 0.004   |
| 3. 47    | 13. 2222.2  |
| 4. 2     | 14. 20705   |
| 5. 3     | 15. 0.06313 |
| 6. 1.55  | 16. 18.295  |
| 7. 4     | 17. 60      |
| 8. 7.3   | 18. 23.5454 |
| 9. 100   | 19. 0.00089 |
| 10. 0.1  | 20. 2.7308  |

## ANSWER KEY TO TEST YOUR KNOWLEDGE QUESTIONS

- |                    |                       |
|--------------------|-----------------------|
| 1. $2\frac{1}{3}$  | 8. $2\frac{5}{7}$     |
| 2. 2               | 9. $\frac{2}{3}$      |
| 3. $\frac{13}{25}$ | 10. $\frac{3}{14}$    |
| 4. $9\frac{3}{8}$  | 11. 12                |
| 5. $1\frac{1}{3}$  | 12. $8\frac{1}{4}$    |
| 6. $\frac{1}{20}$  | 13. $\frac{3}{8}$     |
| 7. $3\frac{5}{8}$  | 14. $24\frac{16}{39}$ |



- |  |                       |
|--|-----------------------|
| 15. $8\frac{5}{8}$   | 33. 4.6               |
| 16. $\frac{1}{5}$  | 34. 7.8               |
| 17. $\frac{9}{7}$  | 35. 9                 |
| 18. $\frac{171}{8}$  | 36. 0.1               |
| 19. $\frac{43}{5}$   | 37. 8.09              |
| 20. $\frac{13}{2}$   | 38. 0.44              |
| 21. $\frac{9}{2}$  | 39. 64                |
| 22. $\frac{34}{3}$   | 40. 9.88              |
| 23. $\frac{1}{4}$  | 41. 20                |
| 24. $\frac{33}{46}$  | 42. 7                 |
| 25. 6  | 43. 1                 |
| 26. $\frac{23}{2} = 11\frac{1}{2}$   | 44. 13                |
| 27. $\frac{56}{31} = 1\frac{25}{31}$   | 45. 0.901             |
| 28. 2  | 46. 21.56             |
| 29. 10 and $\frac{6}{10}$ ; 1 and $\frac{1}{10}$                                   | 47. 5.39              |
| 30. $\frac{9}{18}$ and $\frac{8}{18}$ ; $\frac{17}{18}$                            | 48. 17.308            |
| 31. $\frac{56}{60}$ , $\frac{15}{60}$ , and $\frac{4}{60}$ ; 1 and $\frac{37}{60}$ | 49. 5.08              |
| 32. $\frac{18}{30}$ , $\frac{45}{30}$ , $\frac{5}{30}$ ; 2 and $\frac{4}{15}$      | 50. 2.95              |
|  | 51. -0.206            |
|  | 52. 18.373            |
|  | 53. 41.87             |
|  | 54. 0.00268           |
|  | 55. 8.928             |
|  | 56. 12.19881          |
|  | 57. 23.1524 (rounded) |
|  | 58. 2.0464 (rounded)  |
|  | 59. 40                |
|  | 60. 20                |
|  | 61. 0.15              |
|  | 62. 0.073             |
|  | 63. False             |
|  | 64. False             |
|  | 65. True              |

## CRITICAL THINKING

1. The instruments should be arranged as follows (smallest to largest):

$$\frac{1}{16}, \frac{3}{16}, \frac{1}{4}, \frac{5}{16}, \frac{7}{16}, \frac{1}{2}$$

2. Yes, the missing instrument sizes in sequence are the following:  $\frac{1}{8}$  and  $\frac{3}{8}$