Answers
Chapter 1

1. Use the appendix to answer the following questions about prescriptions and drug orders:
   a. What is a “sig”?  
      *Directions to the patient on how to use the prescription*
   b. What does “Rx” mean?  
      *Recipare or you take; directions to the pharmacist*
   c. Where is information about the prescriber usually found?  
      *Printed at the top of an outpatient prescription*

2. Find the list of Latin prescription abbreviations to define the following abbreviations:
   a. PO  
      *By mouth*
   b. PRN  
      *As needed or necessary*
   c. IV  
      *Intravenous*
   d. QHS  
      *Every evening at bedtime*

3. Where are the learning objectives for each chapter located?  
   *At the beginning of the chapter*

4. Find the glossary and define the following terms:
   a. adverse drug event  
      *Harm resulting from the proper or improper use of a medication*
   b. drug interaction  
      *The alteration of activity, metabolism, or excretion of one drug by another*
   c. compound  
      *Preparation of a product from pharmaceutical-grade ingredients to meet the needs of the patient*

5. Use the Internet to find the body surface area of a 5 year-old boy who is 45 inches tall and weighs 40 pounds.  
   *BSA = 0.76 m²*

6. Why is it important to know the age and weight of a person before performing a dosing calculation? Write a sentence or two to explain.  
   *By knowing the age and weight of a patient, the technician can compare the two to see if the weight is reasonable with respect to the age. The technician can then consider whether the calculated dose makes sense with respect to age and weight.*

7. Why do you think it is important to know what a medication is used for before you fill a prescription with it? Write a sentence or two to explain.  
   *When a technician knows what a drug is used for it helps prevent medication errors. For example, if you only know Viagra® from ads for erectile dysfunction, you would likely question its use in a woman or in an infant. However, if you know a little more, you might be aware that it is a strong vasodilator that is useful in pulmonary hypertension and Raynaud’s syndrome.*
8. An adult male weighs 75 kg. Find his weight in pounds. Does he weigh more in pounds or in kilograms?

\[
75 \text{ kg} \times 2.2 \text{ lb/kg} = 165 \text{ lb}
\]
His weight stays the same in both systems, only the units of measurement changes.

9. Use the Internet to find a case report of a serious dosing or calculation error. Write up a paragraph on the error and include the following:
   a. What was the cause of the error?
   b. What was the age of the person injured?
   c. Were there procedures or practices that contributed to the error?
   d. How might it have been prevented?

Chapter 2

In pharmacy, Roman numerals are most likely to be encountered when reading a prescription. Convert the following pharmacy-related examples as directed in the problem. Refer to Appendix A (Parts of a Prescription), and Appendix C (Frequently Used Prescription Abbreviations and Medical Terminology), for more information.

1. Convert these Roman numeral volumes to Arabic numerals:
   a. iv fluid ounces
      4 fluid ounces
   b. viii oz
      8 ounces
   c. XII oz
      12 ounces

2. The following Roman numeral notations might be found in the sig, or directions, of a prescription. Write the amount so a patient could read it.
   a. iss tsp
      1 ½ teaspoonsful
   b. ii tsp
      2 teaspoonsful
   c. iii gtts
      3 drops

3. On a prescription, some prescribers write the number of tablets or capsules to be dispensed as Roman numerals. Write the following Arabic numerals as Roman numerals.
   a. 120 tablets
      CXX tablets
   b. 36 capsules
      XXXVI capsules
   c. 24 tabs
      XXIV tabs

4. Convert the following Arabic numeral volumes or quantities to Roman numerals:
   a. 3 tsp
      III tsp
b. $\frac{1}{2}$ fl oz
   ss fl oz
   5 mL
   V mL

5. Write these Roman numeral prescription quantities as Arabic numerals. The abbreviation “disp” means dispense.
   a. Disp # XLV
      Disp #45
   b. Disp xxviii tablets
      Disp 28 tablets
   c. Disp xvi oz
      Disp 16 oz

Answer the following problems about place value:

6. Write the place value names for each digit in the following decimal fractions:
   a. 0.125 mg
      0.125 mg; units, tenths, hundredths, thousandths
   b. 0.5 mL
      0.5 mL; units, tenths
   c. 0.375 g
      0.375 g; units, tenths, hundredths, thousandths
   d. 0.02389 g
      0.02389 g; units, tenths, hundredths, thousandths, ten-thousandths, hundred-thousandths

7. Write the place value names for each digit in the following whole numbers:
   a. 4
      4; units
   b. 55
      55; tens, units
   c. 675
      675; hundreds, tens, units
   d. 12,463
      12,463; ten thousands, thousands, hundreds, tens, units

Round as directed in the problem.

8. Round the following to the nearest tenth:
   a. 11.674
      11.7
   b. 22.449
      22.4
   c. 100.39
      100.4
   d. 49.73
      49.7
9. Round the following to the nearest 0.5 mL:
   a. 122.9 mL
      123 mL
   b. 1.4 mL
      1.5 mL
   c. 0.72 mL
      0.5 mL
   d. 17.6 mL
      17.5 mL

10. Patrick is measuring salicylic acid for compounding an ointment. He calculates that he needs to measure 2675 mg of salicylic acid, but the balance (weighing device used in pharmacy) can only measure in increments of 10 mg. How many milligrams should Patrick weigh?
    Patrick should weigh 2680 mg of salicylic acid.

11. René Norris needs to measure 3.5 mL of Augmentin® 600 for her toddler Joe’s ear infection. She has a 5-mL oral syringe, marked in 0.2-mL increments. Can she accurately measure 3.5 mL in the 5-mL syringe?
    Yes, she can draw the Augmentin® suspension up to half-way between the 3.4-mL line and the 3.6-mL line.

12. Dr. Leland calculates that his patient needs a dose of phenobarbital, based on body weight, of 144.58 mg to be given twice a day. Phenobarbital is available in a concentration of 4 mg per mL, so you will need to draw up 36.145 mL for each dose. A 60-mL syringe has 1-mL calibration markings.
    a. To what volume should you round in order to measure as accurately as possible?
       The volume should be rounded to 36 mL for accurate measuring.
    b. Should Dr. Leland be contacted to make this change in the order?
       The pharmacist will need to clarify the order.

13. Patsy Pitts, the pharmacy technician at Save Rite Pharmacy, receives a prescription as follows:
    Promethazine with Codeine
    Disp: viii fl oz
    She sees a 16-fluid ounce bottle that appears to be about half full on the shelf. How many ounces of promethazine with codeine will be left after the prescription is filled?
    If she dispenses 8 ounces, as ordered, there will be no promethazine with codeine left after filling the prescription. Half of a 16-ounce bottle is 8 ounces.

14. Rich Mann is trying to figure out how much medication to dispense for the following prescription:
    Prednisone 1 mg/mL
    Disp: 10 day supply
    Sig: 3 mg (3 mL) p.o. daily
How much prednisone will Rich dispense in order to provide 10 days’ worth of medication?

If 3 mg (3 mL) are given every day, then 3 mL/day × 10 days = 30 mL total needed.

15. Jenny Jones, C.Ph.T., prepares discharge medications for patients going home from the hospital’s surgery center. She receives a discharge prescription with the following Rx:

Vicodin tablets
Disp # XLVIII

She has only one bottle of 100 tablets left and has another prescription for 24 tablets. If she dispenses the Vicodin as ordered here, will she have enough left to fill the second prescription?

XLVII = 48
100 tablets – 48 tablets = 52 tablets
She will have enough to fill both prescriptions.

In the following examples there are problems in the way these prescriptions or drug orders are written. List the errors and explain why they are dangerous.

16, 17, 18. There are three examples of error-causing practices in the way the prescription below is written. Based on what you learned in this chapter, identify the problems and explain why they could be dangerous to the patient.

Beatrice Heinz, M.D.
1200 Du LacPlace
Lakeside, Minn

Name: Anne DeLong
Address: 1248 Saint Cloud Drive, Lakeside

Rx: Levothyroxine 125.0
Disp: xxxx

Sig: One tablet P.O. daily

Refills: 0→2 3

Beatrice Heinz M.D.

16, 17, 18. The prescription includes no units with the levothyroxine, which can lead to dose confusion. In addition, a trailing zero is included after 125. This creates opportunity for error, especially if the decimal point is inconspicuous. The Roman numeral XXXX is an incorrectly written Roman numeral. Did the physician intend to write 30, or intend for the patient to receive 40 tablets (XL)? This would require a telephone call for clarification before filling the prescription.
19, 20. The pharmacy department received the following drug order. Find the two problem-prone writing practices in this order and explain why they are dangerous.

**Morphine Sulfate 2 IV Q 2 hours prn pain.** If patient becomes overly sedated give Narcan .4 mg SC q 15 minutes prn excess sedation, up to 3 doses.

19, 20. Units are not included in the morphine order and may cause confusion. Does the prescriber intend for the patient to receive 2 mg or 2 mL? In addition, the Narcan® order requires a leading zero. Without it the dose could be interpreted as 4 mg.

**Chapter 3**

1. **Find the sum.**
   a. $3 + 9 = 12$
   b. $127 + 13 = 140$
   c. On Monday, Bill the pharmacist sees 19 customers for prescription consultations and pharmacist Don sees 18 customers for consultations. Altogether, how many customers were seen for consultations on Monday?
   $19 + 18 = 37$

2. **Find the difference.**
   a. $18 - 7 = 11$
   b. $124 - 39 = 85$
   c. The C. F. Eye Care hospital had 100 bottles of artificial tears eye drops on the shelf. Fifty-nine bottles were removed because the expiration date had passed. How many bottles remained on the shelf?
   $100 - 59 = 41$

3. **Find the product.**
   a. $8 \times 7 = 56$
   b. $3 \times 4 \times 14 = 168$
   c. Dr. Dee Kay orders that 2 capsules of Zovirax® 200 mg be administered 5 times daily for 14 days. How many capsules are needed?
   $2 \times 5 \times 14 = 140$

4. **Find the quotient.**
   a. $100 \div 20 = 5$
   b. $2)14 = 9$
   c. $6 = 2$ remainder 2

5. **Three hundred vitamin C 250 mg tablets are to be equally distributed among 150 patients.**
   a. How many tablets will each patient receive? Will there be any tablets left over? If so, how many?
   $300 \div 150 = 2$ tablets each, no leftovers
b. One thousand tablets are to be divided into prescription vials containing 30 tablets each. How many vials are needed? Will there be any tablets left over? If so, how many?

\[ 1000 \div 30 = 33 \text{ vials with 10 tablets left over} \]

6. Simplify each fraction.

a. \[ \frac{3}{12} = \frac{1}{4} \]

b. \[ \frac{14}{42} = \frac{1}{3} \]

c. \[ \frac{8}{18} = \frac{4}{9} \]

7. Find the product. Write each product in simplest form.

a. \[ \frac{2}{9} \times \frac{3}{4} = \frac{2 \times 3}{3 \times 2 \times 2} = \frac{1}{6} \]

b. \[ \frac{9}{28} \times \frac{14}{27} = \frac{3 \times 3 \times 2 \times 7}{2 \times 7 \times 3 \times 3 \times 3} = \frac{1}{6} \]

c. \[ \frac{3}{10} \times \frac{5}{6} = \frac{3 \times 5}{2 \times 5 \times 2 \times 3} = \frac{1}{4} \]

8. Find the quotient. Write each quotient in simplest form.

a. \[ \frac{2}{9} \div \frac{4}{3} = \frac{1}{6} \]

b. \[ \frac{9}{10} \div \frac{6}{5} = \frac{3}{4} \]

9. Find the quotient. Write each quotient in simplest form.

a. \[ \frac{2}{27} \div \frac{4}{9} = \frac{2}{27} \times \frac{9}{4} = \frac{2 \times 3 \times 3}{3 \times 3 \times 3 \times 2 \times 2} = \frac{1}{6} \]

b. \[ \frac{3}{4} \text{ of an ounce of hydrocortisone 1% is to be divided into three equal parts. How much will each part contain?} \]

\[ \frac{3}{4} \div 3 = \frac{3}{4} \div \frac{3}{1} = \frac{3}{4} \times \frac{1}{3} = \frac{1}{4} \]

10. Find the sum or difference. Write each in simplest form.

a. \[ \frac{3}{8} + \frac{2}{8} = \frac{5}{8} \]

b. \[ \frac{3}{4} - \frac{1}{4} = \frac{1}{2} \]

c. \[ \frac{1}{9} + \frac{2}{9} = \frac{1}{3} \]
10. Find the sum or difference. Write each in simplest form.
   a. \[
   \text{lcd} = 12, \quad \frac{2}{3} + \frac{1}{4} = \frac{2}{3} \times \frac{4}{4} + \frac{1}{4} \times \frac{3}{3} = \frac{8}{12} + \frac{12}{12} = \frac{11}{12}
   \]
   b. \[
   \text{lcd} = 4, \quad \frac{3}{4} + \frac{1}{8} = \frac{3}{4} \times \frac{2}{2} + \frac{1}{8} = \frac{6}{8} + \frac{1}{8} = \frac{7}{8}
   \]
   c. \[
   \text{lcd} = 12, \quad \frac{2}{3} - \frac{1}{12} = \frac{2}{3} \times \frac{4}{4} - \frac{1}{12} = \frac{8}{12} - \frac{12}{12} = \frac{7}{12}
   \]
   d. \[
   \text{lcd} = 36, \quad \frac{2}{9} + \frac{5}{12} = \frac{2}{9} \times \frac{4}{4} + \frac{5}{12} \times \frac{3}{3} = \frac{8}{36} + \frac{15}{36} = \frac{23}{36}
   \]
   e. \[
   \text{lcd} = 45, \quad \frac{8}{9} - \frac{2}{5} = \frac{8}{9} \times \frac{5}{5} - \frac{2}{5} \times \frac{9}{9} = \frac{40}{45} - \frac{18}{45} = \frac{22}{45}
   \]

11. Rewtite the mixed number as an improper fraction.
   a. \[
   \frac{3}{4} = \frac{11}{4}
   \]
   b. \[
   9\frac{1}{8} = \frac{73}{8}
   \]
   c. \[
   4\frac{2}{3} = \frac{14}{3}
   \]

12. Rewrite the improper fraction as a mixed number.
   a. \[
   \frac{14}{3} = 14 \div 3 = 4R2, \quad \text{so} \quad \frac{14}{3} = 4\frac{2}{3}
   \]
   b. \[
   \frac{21}{5} = 21 \div 5 = 4R1, \quad \text{so} \quad \frac{21}{5} = 4\frac{1}{5}
   \]
   c. \[
   \frac{14}{9} = 14 \div 9 = 1R5, \quad \text{so} \quad \frac{14}{9} = 1\frac{5}{9}
   \]

13. Find the product.
   a. \[
   \frac{2}{3} \times \frac{1}{4} = \frac{1}{3} \times \frac{3}{4} = \frac{1}{4}
   \]
   b. \[
   4\frac{1}{2} \times 1\frac{1}{9} = 5
   \]
   c. \[
   \frac{2}{3} \times 1\frac{1}{4} = 3\frac{1}{3}
   \]

14. Find the quotient.
   a. \[
   \frac{6}{3} \div \frac{5}{3} = \frac{20}{3} \div \frac{10}{3} = \frac{20}{3} \times \frac{3}{5} = 4
   \]
   b. \[
   3\frac{1}{2} \div \frac{1}{4} = \frac{7}{2} \div \frac{1}{4} = \frac{7}{2} \times \frac{4}{1} = 14
   \]

15. Find the product.
   a. \[
   \frac{2}{3} \times \frac{5}{3} = \frac{20}{9} \times \frac{5}{3} = \frac{20}{3} \times \frac{5}{9} = 4
   \]
c. 2 ½ tsp of amoxicillin suspension is to be given in two equal doses. How many tsp will there be in each dose?

\[
\frac{2 \frac{1}{2}}{2} = \frac{5}{2} \div \frac{2}{1} = \frac{5}{2} \times \frac{1}{2} = \frac{5}{4} = \frac{1}{2}
\]

16. Find the sum.

\[
\begin{align*}
\text{a.} & \quad \frac{3}{6} + \frac{5}{8} = 4 \frac{19}{24} \\
\text{b.} & \quad \text{Baby George is to be given 2 ½ teaspoonfuls of prednisone 1 mg/mL each morning and 1 ¼ teaspoonfuls in the afternoon. How many teaspoonfuls of prednisone are to be taken each day?} \\
& \quad 3 \frac{3}{4}
\end{align*}
\]

17. Rewrite the fraction as a decimal fraction.

\[
\begin{align*}
\text{a.} & \quad \frac{3}{8} = 0.375 \\
\text{b.} & \quad \frac{9}{10} = 0.9 \\
\text{c.} & \quad \frac{4}{5} = 0.8
\end{align*}
\]

18. Dr. Denton prescribes one tablet of pseudoephedrine 60 mg to be taken twice daily for 1 month for patient Constance Noring. How many tablets should be dispensed?

60

19. Dr. Gohan N. Sumi directs patient Nora Maki to take one capsule of Augmentin® 250 mg three times a day for 14 days. How many capsules should be dispensed?

\[
\frac{3 \text{ capsules}}{\text{day}} \times 14 \text{ days} = 42
\]

20. Mrs. Johnson is asked to give her daughter Pam \( \frac{3}{4} \) teaspoonful of Bactrim® Suspension 2 times a day for 14 days. The pharmacist fills the order with a bottle of 20 tsp. Is this enough to last for 30 days?

No, she needs 21 tsp.

21. Wanda Hu gets three prescriptions filled every month. Although her insurance company provides prescription coverage, she pays a co-pay for each prescription. For her birth control tablets she pays $15.00, for her albuterol inhaler she pays $15.00, but for her Advair® inhaler she pays $65.00 each month. What is the average co-pay Wanda pays?

\[
\frac{15.00 + 15.00 + 65.00}{3} = 31.67
\]
22. At the class picnic hot dog eating contest, the senior class representative eats 12 hot dogs in 15 minutes, while the junior class contestant can only manage 8 hot dogs in 15 minutes.
   a. Write each class’ hot dog eating results as a ratio of hot dogs/time, and reduce each to hot dogs per minute.
      Seniors: 12 hot dogs/15 minutes or 0.8 hot dogs per minute
      Juniors: 8 hot dogs/15 minutes or 0.53 hot dogs per minute
   b. Which class won the contest?
      Senior

23. Nat Faste, the representative from Code Blue Insurance Company, has granted approval for Wright Pharmacy to fill a 90-day supply of Evan Tooly’s prescription. He takes two ibuprofen 400-mg tablets three times daily. How many tablets do you need to fill this prescription?
   \[
   \frac{3 \times 2 \text{ tablets}}{\text{day}} \times 90 \text{ days} = 540 \text{ tablets}
   \]

24. Complete the table.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>0.5</td>
<td>50%</td>
</tr>
<tr>
<td>3/8</td>
<td>0.375</td>
<td>37.5%</td>
</tr>
<tr>
<td>3/4</td>
<td>0.75</td>
<td>75%</td>
</tr>
<tr>
<td>4/5</td>
<td>0.80</td>
<td>80%</td>
</tr>
<tr>
<td>1/4</td>
<td>0.25</td>
<td>25%</td>
</tr>
<tr>
<td>2/5</td>
<td>0.40</td>
<td>40%</td>
</tr>
</tbody>
</table>

25. The pharmacist asks the pharmacy technician to divide 2000 grams of zinc oxide ointment into several sized jars. He would like the technician to fill ten 60-gram jars, eleven 90-gram jars, and six 30-gram jars.
   a. What is the total amount of zinc oxide used to fill all the jars?
      \[10(60 \text{ g}) + 11(90 \text{ g}) + 6(30 \text{ g}) = 600 \text{ g} + 990 \text{ g} + 180 \text{ g} = 1770 \text{ g}\]
   b. Write the ratio of the amount in the 60-gram jars over the total amount of zinc oxide ointment used and reduce to the simplest form.
      \[
      \frac{600 \text{ g}}{1770 \text{ g}} = \frac{2 \times 3 \times 5}{9 \times 59} = \frac{20}{59}
      \]
   c. Write the fraction determined in Part b as a decimal.
      \[20/59 = 0.34 \text{ when rounded to two decimal places.}\]

Chapter 4

Choose the most appropriate metric unit of weight, volume, or length for the following problems. Choose from the following options: m, cm, mm, L, mL, g, kg, or mg.

1. Medication directions call for 5 mL of cough syrup to be given to a child.
2. One dime weighs about 2 g.
3. Soda is sold in bottles containing 2 L.
4. A pet cat weighs 4 kg.
5. A letter weighs about 20–30 g.

6. John is about 200 cm tall.

7. Directions call for 500 mg of vitamin C to be taken daily.

8. Orders call for 0.1 mL of tuberculin solution to be injected intradermally for a TB skin test.

9. Rewrite, using a numeral and the appropriate abbreviation.
   a. One hundred fifty milliliters
      150 mL
   b. Thirty-four micrograms
      34 mcg
   c. Sixty-five liters
      65 L
   d. Three hundred thirty milligrams
      330 mg
   e. Nine hundred fifty-five grams
      955 g
   f. Five kilograms
      5 kg

10. Rewrite in words.
    a. 915 mcg
        Nine hundred fifteen micrograms
    b. 30 L
        Thirty liters
    c. 145 mL
        One hundred forty-five milliliters
    d. 160 mg
        One hundred sixty milligrams
    e. 175 g
        One hundred seventy-five grams
    f. 10 kg
        Ten kilograms

11. Make the following conversions:
    a. 150 mcg to milligrams
        0.15 mg
    b. 2000 mL to liters
        2 L
    c. 845 kg to grams
        845,000 g
    d. 1.575 g to kilograms
        0.001575 kg
    e. 3000 mg to grams
        3 g
    f. 5000 mg to micrograms
        5,000,000 mcg
    g. 5.35 L to milliliters
        5350 mL
h. 1775 kg to grams
   \[1,775,000 \text{ g}\]
i. 350 mcg to grams
   \[0.00035 \text{ g}\]
j. 14.567 g to milligrams
   \[14,567 \text{ mg}\]

12. Rewrite, using a decimal number and the appropriate abbreviation.
   a. five tenths of a gram
      \[0.5 \text{ g}\]
   b. three tenths of a milligram
      \[0.3 \text{ mg}\]
   c. five and two tenths of a gram
      \[5.2 \text{ g}\]
   d. three hundredths of a liter
      \[0.03 \text{ L}\]
   e. five and six tenths of a milliliter
      \[5.6 \text{ mL}\]

13. Add 300 mL + 4 L + 1.5 L. Express answer in milliliters and in liters.
    \[300 \text{ mL} = 0.3 \text{ L}\]
    \[0.3 \text{ L} + 4 \text{ L} + 1.5 \text{ L} = 5.8 \text{ L}\]
    \[5.8 \text{ L} \times 1000 \text{ mL/L} = 5800 \text{ mL}\]

14. Add 5000 mg + 7 g. Express answer in milligrams and in grams.
    \[12 \text{ g and 12,000 mg}\]

15. Add 455 mg + 365 mcg. Express answer in milligrams and in micrograms.
    \[365 \text{ mcg} = 0.365 \text{ mg}\]
    \[455.365 \text{ mg} \times 1000 \text{ mcg/mg} = 455,365 \text{ mcg}\]

16. Subtract: 2 L – 500 mL. Express answer in liters and milliliters.
    \[1.5 \text{ L and 1500 mL}\]

17. Subtract: 3 g – 3 mg. Express answer in grams and milligrams.
    \[3 \text{ mg} = 0.003 \text{ g}\]
    \[2.997 \text{ g} \times 1000 \text{ mg/g} = 2997 \text{ mg}\]

18. Subtract: 2.5 mg – 100 mcg. Express answer in milligrams and micrograms.
    \[2400 \text{ mcg and 2.4 mg}\]

19. Subtract: 2.5 L – 1.2 L. Express answer in liters and milliliters.
    \[1.3 \text{ L} \times 1000 \text{ mL/L} = 1300 \text{ mL}\]

20. Subtract: 1 L – 750 mL. Express answer in liters and milliliters.
    \[0.250 \text{ L and 250 mL}\]

21. Choose the appropriate conversion factor to convert milligrams to grams.
    \[1 \text{ g/1000 mg}\]

22. Choose the appropriate conversion factor to convert grams to milligrams.
    \[1000 \text{ mg/1 g}\]
23. Choose the appropriate conversion factor(s) to convert mcg to kg.
   \[1 \text{ mg/1000 mcg} \times 1 \text{ g/1000 mg} \times 1 \text{ kg/1000 g}\]

24. Use dimensional analysis to make the following conversions:
   a. \[1.5 \text{ kg} = \underline{\text{____}} \text{ mg}\]
      \[1,500,000 \text{ mg}\]
   b. \[30 \text{ mL} = \underline{\text{____}} \text{ L}\]
      \[0.03 \text{ L}\]
   c. \[5.1 \text{ km} = \underline{\text{____}} \text{ cm}\]
      \[510,000 \text{ cm}\]
   d. \[175,000 \text{ mcg} = \underline{\text{____}} \text{ kg}\]
      \[0.000175 \text{ kg}\]

25. Anita DeSmall, Ph.T., receives a prescription for levothyroxine 0.125 mg tablets. She fills the prescription with levothyroxine 125 mcg tablets. Use dimensional analysis to determine if Anita dispensed the correct drug.
   \[0.125 \text{ mg} \times 1000 \text{ mcg/mg} = 125 \text{ mcg}. \text{This is the correct drug.}\]

Chapter 5

1. Convert the following to milligrams:
   a. 5 grain = 325 mg
      \[5 \text{ gr} \times 65 \text{ mg/gr} = 325 \text{ mg}\]
   b. 1.25 grain = 81 mg
      \[1.25 \text{ gr} \times 65 \text{ mg/gr} = 81 \text{ mg}\]
   c. 1/150 grain = 0.4 mg
      \[1/150 \text{ gr} \times 65 \text{ mg/gr} = 0.4 \text{ mg}\]
   d. 10 grain = 650 mg
      \[10 \text{ gr} \times 65 \text{ mg/gr} = 650 \text{ mg}\]

2. Convert to mg:
   a. 0.1 oz = 2840 mg
   b. 1/8 grain = 8.1 mg (rounded)

3. Convert to the units indicated in the first blank, then use that answer to complete the second conversion in each problem below.
   a. 15 mL = \(\frac{1}{2}\) fl oz = 3 tsp
      \[15 \text{ mL} = \frac{1}{2} \text{ fl oz} (30 \text{ mL/oz}); 15 \text{ mL} \times 1 \text{ tsp/5 mL} = 3 \text{ tsp}\]
   b. 1 pint = 480 mL = 0.48 L
      \[16 \text{ oz/pt} \times 30 \text{ mL/oz} = 480 \text{ mL}; 480 \text{ mL} \times 1 \text{ L/1000 mL} = 0.48 \text{ L}\]
   c. \(\frac{1}{2}\) pint = \(\frac{1}{4}\) quart = 0.24 L
      \[1 \text{ qt/2 pints} \times \frac{1}{2} \text{ pint} = \frac{1}{4} \text{ qt}; \frac{1}{4} \text{ qt} \times 960 \text{ mL/qt} \times 1 \text{ L/1000 mL} = 0.24 \text{ L}\]
   d. 0.25 L = 250 mL = 8.3 fl oz
      \[0.25 \text{ L} \times 1000 \text{ mL/L} = 250 \text{ mL}; 250 \text{ mL} \times 1 \text{ fl oz/30 mL} = 8.3 \text{ fl oz}\]

4. Convert the following to grams:
   a. 0.5 ounce = 14.2 g
   b. 3/8 pound = 170.4 g
   c. 1.5 oz = 42.6 g
   d. \(\frac{3}{4}\) grain = 0.05 g
5. Number the following in order from 1–6, smallest to largest volume.
   Solution: convert each quantity to mL and compare
   a. liter = 1000 mL 6
   b. fl oz = 30 mL 3
   c. tablespoon = 15 mL 2
   d. mL = 1 mL 1
   e. pint = 480 mL 4
   f. quart = 960 mL 5

6. Convert the following to milliliters:
   a. 2 fl drams = 8 mL
   b. 4 fl oz = 120 mL
   c. 2 quarts = 1920 mL
   d. 12 fl oz = 360 mL

7. Convert the following as indicated in the problem:
   a. 1.25 L = 1.3 quart
      \( 1.25 \text{ L} \times 1000 \text{ mL/L} \times 1 \text{ qt/960 mL} \)
   b. 8 fl oz = 240 mL
      \( 30 \text{ mL/fl oz} \times 8 \text{ fl oz} = 240 \text{ mL} \)
   c. 20 mL = 4 tsp
      \( 20 \text{ mL} \times 1 \text{ tsp/5 mL} = 4 \text{ tsp} \)
   d. 180 mL = 6 fl oz
      \( 180 \text{ mL} \times 1 \text{ fl oz/30 mL} = 6 \text{ fl oz} \)

8. Number the following weights in order from smallest to largest, 1–6:
   a. 10,000 mcg 2
   b. 1 mg 1
   c. 5 gr 3
   d. 0.9 g 4
   e. 1 oz 5
   f. \( \frac{1}{2} \) lb 6

9. Change the following to milligrams:
   a. 0.4 lb
      \( 0.4 \text{ lb} \times 454 \text{ g/lb} \times 1000 \text{ mg/g} = 181,600 \text{ mg} \)
   b. 1.1 kg
      \( 1.1 \text{ kg} \times 1000 \text{ g/kg} \times 1000 \text{ mg/g} = 1,100,000 \text{ mg} \)
   c. 8 ounces
      \( 8 \text{ oz} \times 28.4 \text{ g/oz} \times 1000 \text{ mg/g} = 227,200 \text{ mg} \)
   d. 20 grains
      \( 20 \text{ gr} \times 1 \text{ g/15.4 gr} \times 1000 \text{ mg/g} = 1299 \text{ mg} \)

10. Convert the following body weights as indicated in the problem:
    a. Newborn: 10.3 pounds = 4.7 kg
    b. 1 year old: 21 pounds = 9.5 kg
    c. 5 year old: 21.8 kg = 48 lb
    d. 18 year old: 77.6 kg = 170.7 lb
    e. 26 year old: 135 pounds = 61.4 kg
    f. 35 year old: 264.5 pounds = 120.2 kg
In problems 11–14, match the “drug orders” to the correct metric dosage strengths in the list below. (Note*: some pharmaceutical companies equate 60 mg with 1 grain).

11. Thyroid extract 2 grains PO daily
   f

12. Acetaminophen 10 gr supp PR q 4 h prn temp >101
   d

13. Nitroglycerin 1/200 gr SL tab prn chest pain
   h

14. Aspirin 1¼ grain PO daily
   e

   a. Thyroid 30 mg
   b. Nitroglycerin 0.4 mg SL tab
   c. Aspirin 325 mg
   d. Acetaminophen 650 mg supp 10 gr × 65 mg/gr = 650 mg
   e. Chewable aspirin 81 mg 1.25 gr × 65 mg/gr = 81 mg
   f. Thyroid 120 mg 120 mg 65 mg/gr 2 grains = 130 mg (120 mg)
   g. Acetaminophen 120 mg supp
   h. Nitroglycerin 0.3 mg 0.005 gr × 65 mg/gr = 0.33 mg (0.3 mg)

15. Round the conversion factors found in Table 5-3 and the measurements in the problems to check (estimate) whether the following answers are correct. If you believe the answers given are incorrect, explain how you think the error was made.

   a. Baby John Doe weighs 4 pounds 6 ounces. Odessa Baddun, the technician, receives a drug order for 0.2 mg/kg indomethacin PO × 1 dose. She calculates the dose as 4 mg indomethacin.
      
      First convert pounds to kg (rounded): 4 lb × 0.5 kg/lb = 2 kg
      Next, calculate dose: 2 kg × 0.2 mg/kg = 0.4 mg
      Correct or incorrect?
      Incorrect. She made a 10-fold dosing error by losing track of the decimal.

   b. You are filling a prescription for crotamiton lotion to treat the entire Peste family for scabies. After bathing, each family member is to apply lotion to the body. They are to repeat this procedure the next day, then shower to remove the lotion the following day. The pharmacist thinks 30 mL should be adequate for each application for the children and 60 mL for the adults. There are two adults and 4 children. The pharmacist calculates that ½ pint total of the lotion is adequate for both treatments for the whole family.
      
      Calculate amount needed for adults, first. Remember 30 mL = 1 ounce.
      2 adults, 2 ounces each for 2 doses: 2 adults × 2 oz × 2 treatments = 8 ounces
      4 children, 1 ounce each for 2 doses: 4 children × 1 oz × 2 treatments = 8 ounces
      Total needed: 16 oz or 1 pint.
      Correct or incorrect?
      Incorrect. Total required is 1 pint, not ½ pint.
16. Sara James is a 34-year-old female with an acute infection of the kidneys. The hospital-based physician orders tobramycin 2 mg/kg as a one-time loading dose, and requests pharmacist-managed dosing after that. The pharmacist asks you to calculate the first dose. Sara weighs 145 pounds.
   a. What is Sara’s weight in kg?
      
      \[145 \text{ lb} \times \frac{1 \text{ kg}}{2.2 \text{ lb}} = 66 \text{ kg}\]
   b. How much tobramycin will Sara receive in the first dose (rounded to the nearest 10 mg)?
      
      130 mg
   c. Tobramycin solution contains 40 mg in 1 mL. How much tobramycin solution is required to make the dose calculated in Part b?
      
      \[3.3 \text{ mL}\]

17. The technician at SuperRx Pharmacy receives a new prescription from Mrs. Moody and checks the electronic patient profile to verify the patient information is complete. Technicians at the pharmacy usually get the weight from the patient in pounds and calculate the weight in kilograms. The record indicates Mrs. Moody weighs 113 pounds, or 249 kg. What is wrong with this information and how do you think the error occurred?
   
   The person that did the calculation multiplied pounds \times 2.2 \text{ lb/kg} instead of dividing. Mrs. Moody actually weighs 51.4 kg.

For problems 18–20, calculate the amount required per the drug orders.

18. Amoxicillin 20 mg/kg/dose is ordered for James Town. James is 3 years old and weighs 30 pounds. How much amoxicillin per dose will he receive?
   
   273 mg, likely rounded to 275 mg

19. The veterinarian ordered furosemide 2 mg/kg twice a day for Les Waters’ dog, which has heart failure. Round the weight to the nearest kg.
   
   a. His dog weighs 45 pounds. How much will the dog receive in one dose?
      
      \[45 \text{ lb} \times \frac{1 \text{ kg}}{2.2 \text{ lb}} = 20 \text{ kg (rounded)} \times 2 \text{ mg/kg} = 40 \text{ mg}\]
   b. Les’ prescription indicates the furosemide solution contains 10 mg/mL. What volume will he measure for one dose?
      
      \[40 \text{ mg} \times \frac{1 \text{ mL}}{10 \text{ mg}} = 4 \text{ mL}\]

20. April Schauer has a fever. Her mother states that the pediatrician ordered acetaminophen 20 mg/kg of body weight for her first dose, and then acetaminophen 15 mg/kg every 6 hours after that while her oral temperature is 100° F or more. April weighs 66 pounds.
   
   April weighs 30 kg.
   a. How much acetaminophen should April’s mother give her for the first dose?
      
      \[20 \text{ mg/kg} \times 30 \text{ kg} = 600 \text{ mg}\]
   b. What should April’s subsequent acetaminophen doses be?
      
      \[15 \text{ mg/kg} \times 30 \text{ kg} = 450 \text{ mg}\]

21. A physician orders nitroglycerin 1/150 grain to be placed under the tongue for chest pain. The nitroglycerin is available as 0.4 mg and 0.6 mg. Which is correct for this order? (Note: Pharmaceutical companies that make nitroglycerin assume 60 mg = 1 grain.)
   
   \[1/150 \text{ gr} = 0.007 \text{ gr}\]
   
   \[65 \text{ mg}/1 \text{ gr} = x/0.007 \text{ gr}\]
   
   \[x = 0.45 \text{ mg}; \text{ the 0.4-mg tablet is the correct choice}\]
22. Convert the following measurements as indicated.
   a. 1 tablespoon = 15 mL
   b. 1 teaspoon = 5 mL
   c. 2.5 L = 5.2 pint
   d. 500 mL = 16.7 fl oz

23. In 1 week during flu season, the pharmacy where you work received six different prescriptions for Hycodan cough syrup. These include two prescriptions for 4 fl oz, one prescription for 240 mL, one prescription for 180 mL, one prescription for 120 mL, and one prescription for 6 fl oz.
   a. What is the total number of fl oz of Hycodan dispensed that week?
      \[(2 \times 4 \text{ fl oz}) + 6 \text{ fl oz} = 14 \text{ fl oz}\]
      \[240 \text{ mL} + 180 \text{ mL} + 120 \text{ mL} = 540 \text{ mL}\]
      \[540 \text{ mL} \times 1 \text{ oz/30 mL} = 18 \text{ fl oz}\]
      \[14\text{ fl oz} + 18 \text{ fl oz} = 32 \text{ fl oz dispensed}\]
   b. How many mL of Hycodan were dispensed that week?
      \[32 \text{ fl oz} \times 30 \text{ mL/fl oz} = 960 \text{ mL}\]

24. A full bottle of nitroglycerin 0.6 mg contains 25 sublingual tablets. How many grains of nitroglycerin are in a full bottle?
   \[0.6 \text{ mg/tab} \times 25 \text{ tabs} = 15 \text{ mg nitroglycerin in one bottle}\]
   \[15 \text{ mg} \times 1 \text{ gr/65 mg} = 0.23 \text{ grains per bottle of 0.6 mg nitroglycerin}\]

25. Dr. Ole Mann still orders acetaminophen with codeine the old-fashioned way. Using the conversion formula provided in this text, how many milligrams of codeine should be in each tablet of the strengths listed below?
   a. Tylenol with codeine ¼ grain
      \[
      \frac{1}{4} \text{ grain} \times 65 \text{ mg/gr} = 16.25 \text{ mg}
      \]
   b. Tylenol with codeine ½ grain
      \[
      \frac{1}{2} \text{ grain} \times 65 \text{ mg/gr} = 32.5 \text{ mg}
      \]
   c. Tylenol with codeine 1 grain
      \[
      1 \text{ grain} = 65 \text{ mg}
      \]

Chapter 6

1. Dr. Payne orders penicillin G, 5 million units IVPB to be given to patient Anita Little at 2300 and every 4 hours thereafter throughout the day. At what times on a 12-hour clock should the penicillin IVPB be given?
   2300 is 11:00 PM. Therefore, medication should be given at 11:00 PM, 3:00 AM, 7:00 AM, 11:00 AM, 3:00 PM, and 7:00 PM.

2. Patient Joe Kerr is in the emergency room for chest pain and reports taking nitroglycerin 0.4 mg sublingually at 9:30 PM and again at 10:00 PM. What times are these in military time?
   2130 and 2200

3. The records indicate that patient Leigh King was admitted to the hospital at 1600. What time is this on a 12-hour clock?
   \[1600 - 1200 = 4:00 \text{ PM}\]
4. Doctor Kauff ordered that a patient be given KCl 20 mEq IVPB at 1300, 1700, and 2100. Nurse Norma Leigh Lucid administered the medication at 1:00 PM, 7:00 PM, and 11:00 PM. Was the medication given at the correct times?

The first dose was given at the correct time, second should have been given at 5:00 PM, and the third at 9:00 PM.

5. Dr. Lance Boyle orders that patient Ann Teac be given furosemide 20 mg PO at 2400 and every 6 hours thereafter for 24 hours. At what military times should the furosemide be given?

2400 is midnight (first dose), then 0600 (6:00 AM), 1200 (noon), 1800 (6:00 PM), and last dose at 2400 (midnight).

6. Normal body temperature, measured orally, is 98.6°F. What is this in degrees centigrade?

37°C

7. Normal body temperature, measured rectally, is 37.6°C. What is this in Fahrenheit degrees?

°F = (1.8)°C + 32 = 37.6(1.8) + 32 = 99.7°F

8. Water in an Olympic swimming pool is kept between 25°C and 28°C. What are these temperatures in degrees Fahrenheit?

77°F to 82.4°F

9. Water droplets in clouds are often super cooled, that is they remain liquid at temperatures below the usual freezing point. A cloud droplet will freeze as soon as its temperature drops below –40°C. What is this in degrees Fahrenheit?

°F = –40(1.8) + 32 = –40°F

10. Plateau Station, Antarctica, recorded a temperature of –86.2°C on July 20, 1968. What is this temperature in degrees Fahrenheit?

–123.2°F

11. Sodium bicarbonate should be stored between 15°C and 30°C. What are these temperatures in degrees Fahrenheit?

°F = 15(1.8) + 32 = 59°F; °F = 30(1.8) + 32 = 86°F. Between 59°F and 86°F

12. Glucagon should be stored at controlled room temperature between 20°C and 25°C. At what Fahrenheit temperature should glucagon be stored?

Between 68°F and 77°F

13. Diltiazem should be stored at 77°F, but will tolerate temperatures between 59°F and 86°F for brief periods of transport. What are these temperatures in degrees centigrade?

°C = (59 – 32)/1.8 = (45)/1.8 = 15°C; °C = (86 – 32)/1.8 = 30°C. Between 15°C and 30°C.

14. Some medications should be stored in a freezer in which the temperature can range from –4°F to 14°F. What are these temperatures in centigrade?

–20°C and –10°C
15. Some laboratory specimens must be stored in a freezer in which the temperature ranges from –32ºC to –26ºC. What are these temperatures in Fahrenheit?

\[ ^\circ F = \frac{-32}{1.8} + 32 = -26 ^\circ F \quad ^\circ F = \frac{-26}{1.8} + 32 = -15 ^\circ F \]
Between –26ºF and –15ºF when rounded.

16. Varivax® vaccine should be stored between –15ºC and –50ºC. The pharmacy freezer reads –10ºF. Is it in range?

Yes, that would be a temperature of –23ºC.

17. On January 16, 2009, the temperature at Big Black River in Maine was –50ºF. What is this temperature in centigrade?

\[ ^\circ C = \frac{-50 - 32}{1.8} = -46 ^\circ C \]

18. In Tipton, Oklahoma, the temperature was 120ºF on June 27, 1994. What is this temperature in centigrade?

49ºC

19. Before it is opened, injectable insulin should be stored at 0ºC to 8ºC. Should it be stored in the refrigerator, freezer, or at room temperature?

F = 1.8(0) + 32 = 32ºF; \(^\circ F = 1.8(8) + 32 = 46 ^\circ F\). Refrigerator temperatures range from 32ºF – 46ºF; therefore, refrigerate the medication.

20. To maintain potency, Zostavax® should be stored between –58ºF and 5ºF. What are these temperatures in degrees centigrade?

–50ºC and –15ºC

Chapter 7

1. List eight pieces of information required on a prescription.

- Patient name and address
- Name, form, and strength of the medication
- Quantity of the medication to dispense
- Directions to the patient (route of administration, frequency of administration)
- Date written
- Prescriber name and address
- Prescriber signature
- Prescriber classification

2. Write the meaning of the following abbreviations used in compounding:

a. qs
   sufficient quantity
b. ad
   up to
c. aa
   of each
d. comp
   compound

3. Write the meaning of the following routes of administration:

a. p.o.
   by mouth
b. IVP
   IV push

c. IM
   intramuscular

d. top
   topical

4. Decode the following prescription directions and write a simple sentence, in English, as it would appear on the label.
   a. i tab p.o. b.i.d.
      Take one (1) tablet by mouth two times a day.
   b. ii caps p.o. q6h × 7 days
      Take two (2) capsules by mouth every 6 hours for 7 days.
   c. Lantus Insulin 100 units/mL
      sig: 20 units s.c. qAM
      Inject 20 units (0.2 mL) under the skin every morning.
   d. Cortisporin Otic® gtts disp: 15 mL
      sig: gtts iii a.s. t.i.d. 5 days. Place cotton in L canal 5 gtts.
      Instill three (3) drops into the left ear three times a day for 5 days. Place cotton in the left ear canal after the drops.

5. Interpret the following drug orders as a nurse might read them and write out your interpretation.
   a. Zosyn 2.25 g IVPB Q8H
      Give Zosyn 2.25 g by intravenous piggyback every 8 hours.
   b. Morphine sulfate 5 mg sc q3H prn moderate pain or S.O.B.
      Give morphine sulfate 5 mg by subcutaneous injection every 3 hours if needed for moderate pain or shortness of breath.
   c. NS 1000 mL IV to run at 125 mL/hr
      Infuse 1000 mL normal saline intravenously at a rate of 125 mL per hour.
   d. Naloxone 0.4 mg IVP stat and q 15–30 min prn respiratory depression
      Give naloxone 0.4 mg by intravenous push immediately and repeat every 15 to 30 minutes if needed for respiratory depression.

6. Why is each the following abbreviations on the “Do Not Use” list? Explain the potential problem for each dangerous abbreviation and the safe alternative.
   a. QD
      QD could be mistaken for QID, resulting in a 4 × overdose. Use daily or Q day instead.
   b. trailing zero (i.e., 4.0 mg)
      A trailing zero may result in a ten-fold overdose if the decimal point is light or illegible. Never use a trailing zero.
   c. U
      Using a capital letter U can be mistaken for a zero, resulting in a ten-fold error. Write out “units.”
   d. lack of a leading zero (i.e., .4 mg)
      Lack of a leading zero may result in a ten-fold error if decimal is faint or illegible.
7. Check the following DEA numbers to see if they meet the test for validity. Indicate why you think they could be valid or are invalid.
   a. Wilma Ruth, MD, DEA Registration # A.R. 1234563
   1. 1 + 3 + 5 = 9       2. 2 + 4 + 6 = 12       3. 2 × 12 = 24       4. 24 + 9 = 33
      Could be valid
   b. Daniel Bones, MD, DEA. Registration # B.D. 2754388
      Could be valid
   c. Rebecca Darling, DVM, DEA Registration # B.D 5704386
      Could be valid

8. A prescription for Tylenol® with codeine liquid for Jonathan Jameson, who broke his leg when he fell off the monkey bars, instructs the parents to give their child 5 mL every 4 hours if needed for pain. The physician wants the pharmacy to dispense a 5-day supply. How much should the pharmacy dispense? Assume the child takes the medication as ordered, around the clock.
   If the child takes as many doses as possible, he will receive 6 doses per day.
   \[
   \frac{24 \text{ h/day}}{4 \text{ h}} = 6 \text{ doses per day}
   \]
   Each dose is 5 mL. 6 doses × 5 mL = 30 mL/day × 5 days = 150 mL

9. Write the abbreviations that correspond to the following words or phrases.
   a. capsule
      cap
   b. suspension
      susp
   c. after meals
      pc
   d. twice a day
      BID
   e. as directed
      UD
   f. no known allergies
      NKA

10. Lantus® Insulin contains 100 units per mL and is sold in a 10-mL vial. If a patient injects 15 units (0.15 mL) QHS, at what time of day will he be administering the insulin?
    At bedtime.
    How much insulin will he use in 1 week?
    He will use 105 units or 1.05 mL

11. Lantus® Insulin expires 28 days after the vial is opened. If the patient in problem 10 uses his insulin as ordered, how much will be left in the vial after 28 days?
    0.15 mL/day × 28 days = 4.2 mL used. 10 mL – 4.2 mL = 5.8 mL remaining.
12. What information is needed before you can fill the following prescription?

<table>
<thead>
<tr>
<th>Name:</th>
<th>Carter Moss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address:</td>
<td>15510 Ave 313, Visalia, CA</td>
</tr>
<tr>
<td>Rx:</td>
<td>Azithromycin  250 mg/5 ml</td>
</tr>
<tr>
<td>Sig:</td>
<td>i tsp q 6</td>
</tr>
<tr>
<td>Date:</td>
<td>2/29/12</td>
</tr>
<tr>
<td>Dan Kashain, M.D.</td>
<td></td>
</tr>
</tbody>
</table>

You will need to know the volume to be dispensed, the route of administration (it is safe to assume that it is to be given by mouth since it is ordered as a teaspoonful), and the duration of therapy.

13. List four routes of administration by which medication may be administered.

- PO (by mouth), IV (intravenous), SC (subcutaneous injection), IM (intramuscular injection), TOP (topical), SL (sublingual), and others.

14. List three causes of errors that can occur while filling a prescription and three corresponding methods for preventing the error.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illegible prescriptions or drug orders</td>
<td>Computerized prescription systems</td>
</tr>
<tr>
<td>Selecting an incorrect medication</td>
<td>Clarify a confusing order</td>
</tr>
<tr>
<td>Look-alike sound-alike drugs</td>
<td>Tall man lettering, bar code scanning, double-checking your work</td>
</tr>
</tbody>
</table>

15. Write out the directions listed below completely, as you would type them on a prescription label.

- a. ii gtts o.s. qid while awake
  
  *Instill two (2) drops in the left eye four times a day, while awake.*

- b. 15 mL p.o. q4h prn cough or congestion
  
  *Take one tablespoonful (15 mL) by mouth every 4 hours if needed for cough or congestion.*

- c. i tab sl q 5 min × 3 prn chest pain
  
  *Place one tablet under the tongue if needed for chest pain. May repeat every five (5) minutes for 3 doses if chest pain persists.*

- d. caps ii p.o. B.I.D for blood pressure
  
  *Take two (2) capsules by mouth twice a day for blood pressure.*

16. Write the meaning of the following abbreviations:

- a. oz

  *ounce*

- b. AC and HS

  *before meals and at bedtime*
c. q8h
   every eight (8) hours
d. prn
   if needed
e. au
   both ears
f. qs
   quantity sufficient

17. Calculate the number of tablets needed to fill the following prescription:
   Rx: Azithromycin 250 mg tablets
   Disp: 5 day supply
   Sig: tabs ii now, then i tab daily
   2 (now) + (1 tab/day × 4 days) = 6 tablets

18. For the following drug order: Vancomycin 1 g IVPB Q 12H × 6 weeks for osteomyelitis
   a. How many IVPB doses will the patient receive daily?
      Every 12 hours = 2 doses per day.
   b. How many doses will the patient receive over the entire course of therapy?
      2 doses/day × 7 days/week × 6 weeks = 84 doses

19. You receive the following prescription for amoxicillin suspension for a child with an acute middle ear infection:
   Amoxicillin susp. 400 mg/5 mL
   320 mg (4 mL) Q8H × 7 days
   Amoxicillin 400 mg/5 mL for suspension is available in 50 mL, 75 mL, and 100 mL bottles. Which size will you dispense?
   4 mL/dose × 3 doses/day = 12 mL/day
   12 mL/day × 7 days = 84 mL; therefore the 100-mL bottle is necessary

20. The automated dispensing cabinet in the ICU needs to be filled with enough hydromorphone 1 mg vials to last the next 24 hours. Three patients in the unit have the following orders:
   Patient A: Hydromorphone 1 mg Q4H prn moderate pain
   Patient B: Hydromorphone 1 mg Q2H prn moderate to severe pain
   Patient C: Hydromorphone 0.5 mg Q3H for pain
   Assume that each patient will take the maximum dose allowed. There are 12 vials available in the unit at present. Partial vials cannot be saved for another dose.
   a. How many total vials are needed for 24 hours?
      26
   b. How many more hydromorphone vials will you need to add to last 24 hours?
      26 – 12 = 14

21. For each of the sigs given below, state how many doses the patient will receive in 1 day.
   a. Q2h
      24 h/day × 1 dose/2 h = 12 doses/day
   b. TID
      3 doses/day
   c. Q8h
      24 h/day × 1 dose/8 h = 3 doses/day
22. What is the maximum number of doses/day the patient should take for these sigs?
   a. Q4H prn
      6 doses
   b. Q3H prn, max 6 doses/day
      6 doses
   c. Q2H while awake (assume patient sleeps 8 hours)
      \[24h - 8h = 16 \text{ hours or 8 doses}\]

23. The pharmacist receives the following prescription for compounding:
   
<table>
<thead>
<tr>
<th>Drug</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>60 mL</td>
</tr>
<tr>
<td>B</td>
<td>500 mg</td>
</tr>
<tr>
<td>Alcohol 70%</td>
<td>60 mL</td>
</tr>
<tr>
<td>Lotion C qs ad</td>
<td>200 mL</td>
</tr>
</tbody>
</table>

   a. What does qs ad mean?
      \textit{Quantity sufficient to make}

   b. The pharmacy has a 6-ounce bottle of lotion C on the shelf. Will that be enough to compound the prescription?
      
      \[\text{Drug A + alcohol} = 120 \text{ mL}\]
      \[200 \text{ mL} - 120 \text{ mL} = 80 \text{ mL maximum. 6 ounces is enough.}\]

24. How many tablets or capsules will be dispensed with each of the following prescriptions:
   
   a. Tetracycline 250-mg capsules, one BID for acne
      disp: 1 month’s supply
      \[2 \text{ doses/day} \times 30 \text{ days} = 60 \text{ capsules}\]
   b. Lomotil tabs, q3h prn diarrhea, max 6/day
      disp: 1 week supply
      \[6 \text{ tablets/day} \times 7 \text{ days} = 42 \text{ tablets}\]
   c. Ampicillin 500-mg capsules, take 2 grams 30 minutes before dental procedures on Monday and Thursday this week and Tuesday next week.
      \[4 \text{ caps/procedure} \times 3 \text{ procedures} = 12 \text{ capsules}\]

25. For each of the past 4 weeks, the usage of Vicodin® tablets from the automated dispensing cabinet you fill is as follows:
   
<table>
<thead>
<tr>
<th>Week</th>
<th>Tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>86</td>
</tr>
<tr>
<td>2</td>
<td>120</td>
</tr>
<tr>
<td>3</td>
<td>93</td>
</tr>
<tr>
<td>4</td>
<td>112</td>
</tr>
</tbody>
</table>

   a. How many Vicodin® tablets are used in an average week?
      \[103 \text{ (rounded)}\]
   b. The current tablet count in the drawer is 7 tablets and the maximum for the drawer is 125 tablets. How many tablets should you add to reach the maximum?
      \[125 - 7 = 118 \text{ tablets}\]
Chapter 8

Solve the following equations.

1. \( \frac{1}{10} x = 25 \)
   
   \( \frac{1}{10} x = 25 \)
   
   \( 10 \times \frac{1}{10} x = 10 \times 25 \)
   
   \( x = 250 \)

2. \( 0.001x = 325 \)
   
   \( 325,000 \)

3. \( 100x = 50 \)
   
   \( 100x = 50 \)
   
   \( \frac{100x}{100} = \frac{50}{100} \)
   
   \( x = \frac{1}{2} \)

4. \( x - 5 = 235 \)
   
   \( 240 \)

5. \( 30x + 15 = 345 \)
   
   \( 30x + 15 = 345 \)
   
   \( 30x + 15 - 15 = 345 - 15 \)
   
   \( 30x = 330 \)
   
   \( \frac{30x}{30} = \frac{330}{30} \)
   
   \( x = 11 \)

Identify the unknown (define the variable) in the following situations.

6. A prescription requires that amoxicillin 500 mg be given three times daily for 10 days. Amoxicillin is available in 500-mg capsules. How many capsules are needed to fill the prescription?
   
   Let \( x \) = the number of capsules needed to fill the prescription.

7. Ritalin® is available in 20-mg scored tablets. How many tablets should be given per dose if the dose is 30 mg?
   
   Let \( x \) = the number of tablets that should be given in one dose.

8. A prescription calls for 5 mg of Valium® to be taken twice daily. How many grams of Valium® will the patient take in 30 days?
   
   Let \( x \) = the number of grams of Valium the patient will ingest in 30 days.
9. A prescription calls for 40 mg of furosemide to be given four times daily. How many milligrams of furosemide will be taken daily?
   Let \( x \) = the number of milligrams of furosemide taken daily.

10. A prescription calls for 10 mg of Inderal® to be taken three times daily. How many milligrams of Inderal® will the patient take in 30 days?
    Let \( x \) = the number of milligrams of Inderal® the patient takes in 30 days.

Identify the unknown (define the variable) in the following situations. Make an estimate of the answer.

11. A prescription for risperidone 1 mg calls for 1 tablet three times daily for one day, then two tablets twice a day for one day, then three tablets twice a day for seven days. How many tablets are needed to fill the prescription?
    Let \( x \) = the number of tablets needed to fill the prescription. Estimate 45 to 50 (3 tabs BID = 6/day for 7 days plus extras).

12. Tetracycline is available in 250-mg capsules. A prescription calls for two capsules four times a day for 10 days, then one capsule four times a day for 20 days. How many milligrams of tetracycline will the patient ingest over 30 days?
    Let \( x \) = the number of milligrams of tetracycline taken over 30 days. Estimate 50,000 mg.

13. A prescription calls for one tablet to be taken four times a day. Ninety tablets are dispensed. How many days should this prescription last?
    Let \( x \) = the number of days the prescription should last. Estimate 20–25 days (round 90 to 100 and divide by 4).

14. A pharmacy stocks 124 bottles of vitamins on the shelf. One third of these are destroyed because they are past the “use by” date. How many bottles are destroyed?
    Let \( x \) = the number of bottles that are destroyed. Estimate 40.

15. Seventy-two percent of a 500-mL solution is water. How many milliliters of the solution is water?
    Let \( x \) = the number of milliliters of water. Estimate 375 mL (75% or \( \frac{3}{4} \) of 500 mL).

Identify the unknown (define the variable) in the following situations. Make an estimate of the answer. Translate the situation to an equation. Solve the equation and check solution for reasonableness with your original estimate.

16. A pharmacy stocks 720 tablets on the shelf. Two thirds of these are used to fill prescriptions. How many tablets remain?
    240 tablets

17. A pharmacist had 2 g of Drug C. He used it to prepare the following:
    8 capsules each containing 0.0325 g
    12 capsules each containing 0.015 g
    18 capsules each containing 0.0008 g
    How many grams of Drug C were left after he prepared the capsules?
Let \( x = \text{number of grams of Drug C that are left.} \)
\[
x = 2 - 8(0.0325) - 12(0.015) - 18(0.0008)
\]
\[
x = 1.5456
\]

18. A 45-gram tube of anti-itch cream contains 1% diphenhydramine hydrochloride. How many grams of the diphenhydramine hydrochloride does the tube contain?

\[
0.45 \text{g diphenhydramine}
\]

19. A prescription written for penicillin VK 250-mg tablets instructs that one tablet be taken every 6 hours.

a. How many tablets should the patient take each day?

Let \( x = \text{number of tablets the patient should take each day.} \)
\[
x = \frac{1 \text{ tablet}}{6 \text{ hours}} \times 24 \text{ hours}
\]
\[
x = 4 \text{ tablets}
\]

b. If the pharmacist dispenses 28 tablets, how long should the prescription last?

Let \( x = \text{number of days the prescription will last.} \)
\[
x = \frac{28 \text{ tablets}}{4 \text{ tablets/day}}
\]
\[
x = 7 \text{ days}
\]

20. Pepcid® is available in 20-mg scored tablets.

a. How many tablets should be given per dose if the dose is 30 mg?

1.5

b. If the patient is to take one dose per day for 30 days, how many tablets should be dispensed?

45

21. Zyrtec® is available in scored 10-mg tablets. A patient takes 5 mg daily for 30 days. How many tablets are needed?

Let \( x = \text{number of 10-mg Zyrtec® tablets} \)
\[
x = \frac{5 \text{ mg/day}}{5 \text{ mg}} \times \frac{1}{2} \text{ tablet} \times 30 \text{ day} = 15 \text{ tablets}
\]

22. Mr. Blue takes one 37.5 mg Effexor® tablet twice a day for 14 days.

a. How many tablets are taken in the 14 days?

28 tablets

b. How many milligrams of Effexor® are taken over the 14 days?

1050 mg

23. On Monday, Ivan Aik filled his prescription for 75 Vicodin® 500-mg tablets. He takes them as needed for pain, up to eight tablets per day. By Sunday morning (6 days later), \(\frac{3}{5}\) of the original 75 tablets are left.

a. How many are left?

Let \( x = \text{number of Vicodin® tablets that are left.} \)
\[
x = \frac{3}{5} (75)
\]
\[
x = 45
\]

There are 45 tablets left
b. How many Vicodin® tablets did Ivan take?
   
   Let \( y \) = the number of tablets Ivan took
   
   \[ y = 75 - 45 \]
   
   \[ y = 30 \]
   
   Ivan took 30 Vicodin® tablets.

c. If Ivan took the same number of tablets each day, did he take more than eight tablets per day?
   
   Let \( D \) = number of tablets taken per day
   
   \[ D = 30 \text{ tablets}/6 \text{ days} \]
   
   \[ D = 5 \text{ tablets/day} \]
   
   No, Ivan did not take more than eight tablets per day.

24. A patient takes one 20-mg tamoxifen tablet twice daily for 30 days. How many tablets are taken each month?
   
   60 tablets

25. Karl Kardyo takes warfarin 5 mg once a day for three months (90 days). How many milligrams of warfarin does Karl take in 3 months?
   
   Let \( x \) = number of mg of warfarin taken in 3 months
   
   \[ x = (5 \text{ mg/day})(90 \text{ days}) \]
   
   \[ x = 450 \text{ mg} \]
   
   Karl takes 450 mg of warfarin in 3 months.

Chapter 9

1. Write the following statements as ratios:
   
   a. Many potato salad recipes call for 6 cups of peeled and chopped potatoes for 8 servings of potato salad.
   
   \[ 6 \text{ c potatoes}/8 \text{ servings} \]
   
   b. Jennifer drives 475 miles on 10.5 gallons of gas in her new Prius.
   
   \[ 475 \text{ miles}/10.5 \text{ gal} \]
   
   
   \[ $6.99/12 \text{ oz} \]
   
   d. There are 900 calories in a double cheeseburger.
   
   \[ 900 \text{ cal}/1 \text{ double cheeseburger} \]

2. Write the following statements as ratios, using a colon to separate the values:
   
   a. 1 gram per 10,000 mL
   
   \[ 1:10,000 \]
   
   b. 3 grams per 100 mL
   
   \[ 3:100 \]
   
   c. 1 part of vinegar to 3 parts of olive oil
   
   \[ 1:3 \]

3. Write the following ratios as fractions:
   
   a. 3:4
   
   \[ 3/4 \]
   
   b. 1:10
   
   \[ 1/10 \]
c. 9:1000
   \[9/1000\]
d. 2:3
   \[2/3\]

4. Write the following dosage strengths as ratios:
   a. Tetracycline 250-mg capsule
      \[\text{Tetracycline 250 mg/cap}\]
   b. Phenobarbital 20 mg in 5 milliliters
      \[\text{Phenobarbital 20 mg/5 mL}\]
   c. Amikacin 250 mg per mL
      \[\text{Amikacin 250 mg/mL}\]
   d. 10-mg enalapril tablet
      \[\text{Enalapril 10 mg/tab}\]

5. On the following drug labels, find the drug strength per mL:
   a. Source: Reprinted with permission of Hospira, Inc.
      \[20 \text{ mg/mL}\]
   
   b. Source: Reprinted with permission of Pfizer Inc.
      \[40 \text{ mg/mL}\]
6. When solving a ratio and proportion equation, make sure the _________
    units are the same in the numerator and denominator of each ratio.

7. A vial of furosemide for injection contains 40 mg/4 mL. What volume of
    furosemide for injection contains 10 mg?
    \[ 40 \text{ mg/4 mL} = 10 \text{ mg/x} \quad x = 1 \text{ mL} \]

8. Paul, the P.T., needs to add 600 mg of vancomycin to an IVPB bag. When
    reconstituted, the vancomycin vial will contain 1 g/10 mL. What volume of
    reconstituted vancomycin solution will Paul draw up in the syringe in order
    to add the required 600 mg?
    \[ 1 \text{ g/10 mL} = 0.6 \text{ g/x} \quad x = 6 \text{ mL} \]

9. Epinephrine is available in a 1:1000 solution and a 1:10,000 solution.
   a. Which product contains more epinephrine per mL?
      1:1000 means 1 gram/1000 mL and 1:10,000 means 1 g/10,000 mL, so 1:1000
      contains more.
   b. How many mg of epinephrine are in 10 mL of a 1:10,000 solution?
      \[ 1000 \text{ mg/10,000 mL} = x/10 \text{ mL} \]
      \[ x = 1 \text{ mg} \]

10. An IVPB order calls for amikacin 350 mg. The pharmacy stocks 500-mg
    vials that contain 2 mL. What volume of this solution will provide the needed
    350 mg?
    \[ 1.4 \text{ mL} \]

11. The ABC pharmacy in the pediatrics clinic carries erythromycin ethyl
    succinate suspension in a concentration of 400 mg/5 mL. Dr. Darlene Bebe
    ordered a dose of 300 mg Q6 hours and wants a 10-day supply for her
    patient.
    a. What volume of the suspension contains 300 mg erythromycin ethyl
       succinate?
       \[ 400 \text{ mg/5 mL} = 300 \text{ mg/x} \]
       \[ x = 3.75 \text{ mL} \]
    b. Should the pharmacy dispense the 100-mL bottle or the 200-mL bottle to
       provide enough for 10 days?
       \[ 24 \text{ h/d} \times 1 \text{ dose/6 hours} = 4 \text{ doses/day} \]
       \[ 3.75 \text{ mL/dose} \times 4 \text{ doses/day} = 15 \text{ mL/day or 150 mL in 10 days} \]
       dispense the 200-mL bottle

12. Normal saline solution contains 0.9 g sodium chloride in 100 mL. How much
    sodium chloride is contained in 250 mL normal saline?
    \[ 2.25 \text{ g NaCl in 250 mL NS} \]

13. Phenytoin oral suspension contains 125 mg of the drug in 5 mL. The
    physician orders 250 mg to be given every 12 hours.
    a. What volume of the suspension will the patient receive per dose?
       \[ 125 \text{ mg/5 mL} = 250 \text{ mg/x} \]
       \[ x = 10 \text{ mL} \]
    b. When taken according to the directions, how many mL will the patient receive
       in a day?
       \[ 10 \text{ mL/dose} \times 2 \text{ doses/day} = 20 \text{ mL/day} \]
c. How long will an 8-fl oz bottle last?
   \[240 \text{ mL/bottle} \times 1 \text{ day}/20 \text{ mL} = 12 \text{ days/bottle}\]

14. Mia Cord brings in a prescription for carvedilol. She is to take 9.75 mg twice daily for early heart failure and elevated blood pressure. Carvedilol is available in strengths of 3.25 mg and 6.5 mg.
   a. Which strength would you choose to fill this prescription and why?
      \[3.25 \text{ mg, because the patient can take three whole tablets to make a dose with no need for splitting}\]
   b. How will the directions for dosing read?
      \[Take three tablets (9.75 mg) by mouth twice a day for heart failure and elevated blood pressure\]

15. Solve the following proportion equations:
   a. \[1:10,000 :: 5:x\]
      Read 1 is to 10,000 as 5 is to x. Equation may be rewritten \[1/10,000 = 5/x\], or solved as follows:
      \[\frac{1}{10,000} = \frac{5}{x}\]
      \[x = 50,000\]
   b. \[1 \text{ gram}/10 \text{ mL} = x/350 \text{ mL}\]
      \[x(10 \text{ mL}) = 1 \text{ g}(350 \text{ mL})\]
      \[x = 35 \text{ g}\]
   c. \[500 \text{ mcg}/2 \text{ mL} = 750 \text{ mcg}/x\]
      \[x(500 \text{ mcg}) = 750 \text{ mcg}(2 \text{ mL})\]
      \[x = 3 \text{ mL}\]
   d. \[3:18 :: x:162\]
      \[3(162) = 18(x)\]
      \[x = 27\]

16. Drug Y 292.5 grams is the active ingredient used to make 130,000 tablets. What is the strength, in milligrams, of one tablet?
   \[292.5 \text{ g}/130,000 \text{ tabs} = 2.25 \text{ mg/tab}\]

17. A 20-mL multidose vial of vaccine costs $475. One dose of vaccine is 0.5 mL.
   a. How many people can be vaccinated with one vial?
      \[20 \text{ mL}/0.5 \text{ mL/dose} = 40 \text{ doses}; therefore, 40 \text{ people can be vaccinated}\]
   b. What is the cost per dose of vaccine?
      \[\frac{475}{40 \text{ doses}} = \$11.88/\text{dose}\]

18. Maxeton Compounding Pharmacy’s special “Baby’s Bottom” diaper ointment contains 10 grams of zinc oxide and 30 mL of antacid in every 100 grams of ointment. The pharmacist at Maxeton Pharmacy asks Howie Dewitt, the new technician, to make one pound of the diaper ointment.
   a. How many grams of ointment are in 1 pound?
      \[454 \text{ g} = 1 \text{ lb}\]
   b. How much zinc oxide will Howie weigh out for 1 pound of ointment?
      \[45.4 \text{ g}\]
   c. How much antacid suspension will Howie measure for the ointment?
      \[136.2 \text{ mL}\]
19. You are planning a pizza party for the pharmacy department. On average, each person usually eats three slices of pizza, and a large pie contains 12 slices. There are 17 pharmacists and technicians coming. How many large pizzas should you order to make sure there is enough for 3 slices each?

\[
\text{3 slices/person} \times 17 \text{ persons} = 51 \text{ slices of pizza needed}
\]

\[
1 \text{ pizza/12 slices} \times 51 \text{ slices needed} = 4.25 \text{ pizzas, or 5 pizzas to feed everyone}
\]

20. The total weight of 100 alprazolam 0.5-mg tablets is 3.75 grams. What is the ratio of active ingredient to filler in 100 tablets?

\[
1 \text{ tablet weighs 37.5 mg}
\]

\[
0.5 \text{ mg active ingredients/37.5 mg filler, or 1:75}
\]

21. Deanna, the dietician, is talking to Betty Baker, recently diagnosed with diabetes, about her diet. Betty loves to make apple pies. Deanna says the calories in a 9-inch apple pie come from 260 g carbohydrates (from apples, sugar, and flour) and 110 g fat. The entire pie contains 2030 calories.

a. If the pie is divided in 8 equal pieces, how many calories are in 3 pieces?

\[
2030 \text{ cal/8 pieces} = x/3 \text{ pieces}
\]

\[
x = 761.25 \text{ cal}
\]

b. There are 1040 calories provided by the 260 g of carbohydrates in the whole pie. How many calories does 1 gram of carbohydrate provide?

\[
1040 \text{ cal/260 g carbs} = 4 \text{ cal/g carbohydrate}
\]

c. If the remaining calories come from 110 grams of fat, how many calories are derived from 1 gram of fat?

\[
2030 \text{ total cal} - 1040 \text{ cal (from carbs)} = 990 \text{ cal from fat}
\]

\[
990 \text{ cal/110g fat} = 9 \text{ cal/g fat}
\]

22. The dermatologist in Our Town Pharmacy has a special formula for erythromycin 2% gel. The formula contains:

- **Erythromycin** 2 g
- **Hydroxypropyl cellulose** 2 g
- **Ethyl alcohol 70% qs** 100 mL

You are asked to make up a pint of the gel.

a. How much erythromycin is needed to make 1 pint?

\[
2 \text{ g/100 mL} = x/480 \text{ mL}; x = 9.6 \text{ g erythromycin}
\]

b. How much hydroxypropyl cellulose is needed to make 1 pint?

\[
9.6 \text{ g hydroxypropyl cellulose}
\]

23. Our Town Pharmacy is running out of the ingredients for the formulation in Problem 22. The pharmacist asks you to order erythromycin and hydroxypropyl cellulose to make 3-month’s supply of the erythromycin 2% gel. She says that the average amount compounded in 1 month is 2.5 liters. The powder is available in 500-g containers and the hydroxypropyl cellulose is available in 1-pound containers. How many containers of each will you order?

\[
\text{2 grams of each ingredient are needed for each 100 mL}
\]

\[
\text{Number of batches of the 100 mL formulation needed/month: 2500 mL/100 mL} = 25 \text{ batches/month}
\]

\[
25 \text{ batches/mo} \times 2 \text{ g/batch} \times 3 \text{ months} = 150 \text{ g used in 3 months.}
\]

Therefore, order one container of each.
24. Peter Ivanakoff has a cold. He decides to purchase a bottle of cough syrup that contains guaifenesin 200 mg and pseudoephedrine 40 mg in 5 mL.

a. How much guaifenesin and pseudoephedrine are contained in 8 fluid ounces of the syrup?

\[
8 \text{ fl oz} \times 30 \text{ mL/fl oz} = 240 \text{ mL} \\
200 \text{ mg/5 mL} = x/240 \text{ mL} \\
x = 200 \text{ mg (48)} = 9,600 \text{ mg or 9.6 g guaifenesin} \\
\text{pseudoephedrine 40 mg/5 mL} = x/240 \text{ mL} \\
x = 40 \text{ mg (48)} = 1920 \text{ mg or 1.92 g pseudoephedrine} 
\]

b. If the patient takes 10 mL of the syrup three times a day, how many days will an 8-fluid ounce bottle last?

\[
10 \text{ mL/dose} \times 3 \text{ doses/day} = 30 \text{ mL/day} \\
30 \text{ mL/day} \times 1 \text{ bottle/240 mL} = 1 \text{ bottle/8 days} 
\]

25. Riley Quick, C.Ph.T., and Nita Gallop, C.Ph.T., have decided to see who is fastest at counting and pouring medication for prescriptions. Nita does the counting and pouring for 43 prescriptions in 3.5 hours. How many prescriptions will Riley need to prepare in his 7.5-hour shift to beat Nita?

Nita’s rate: 43 prescriptions/3.5 hours = 12.3 prescriptions/hr

Riley must fill more than: 12.3 prescriptions/hr × 7.5 hours = 92.25 prescriptions

If Riley fills 93 prescriptions or more in 7.5 hours he will beat Nita’s rate.

Chapter 10

1. A drug order from the nursing home your pharmacy services reads “venlafaxine 56.25 mg p.o. BID.” The pharmacy carries 37.5-mg tablets and 75-mg tablets.

a. What strength tablets will you use to fill this order and why?

You will provide 37.5-mg tabs because they require the least amount of tablet splitting, thereby being most safe and convenient for the patient.

b. How many tablets will the patient take per dose?

1½ of the 37.5 mg tablets = 56.25 mg

2. A drug order for Tammy Taylor, a 2-year-old, reads ondansetron 0.15 mg/kg IV push to be given as a premedication before chemotherapy. Tammy weighs 25 pounds. The ondansetron injection contains 4 mg/2 mL.

a. What is Tammy’s weight in kg?

\[11.4 \text{ kg}\]

b. What is the dose of ondansetron she will receive?

\[11.4 \text{ kg} \times 0.15 \text{ mg/kg} = 1.7 \text{ mg}\]

c. What volume of ondansetron solution contains this dose?

\[0.85 \text{ mL}\]

3. Hedda Aiken is an 18-month-old admitted to the pediatric hospital with meningitis. The admitting physician orders Rocephin®, 80 mg/kg/day, in two divided doses. Hedda weighs 19 pounds.

a. What is Hedda’s weight in kg?

\[19 \text{ lb} \times 1 \text{ kg/2.2 lb} = 8.64 \text{ kg}\]

b. How many milligrams of Rocephin® will Hedda receive?

\[8.64 \text{ kg} \times 80 \text{ mg/kg} = 691 \text{ mg (round to 700 mg for accurate measuring)}\]
c. The hospital carries Rocephin® in a ready-to-use formulation that contains 1 gram in 50 mL. What volume will you draw up to fill Hedda’s order?

\[ \frac{1 \text{ g}}{50 \text{ mL}} = \frac{0.7 \text{ g}}{x} \]

\[ x = 35 \text{ mL} \]

4. You receive a prescription for azithromycin suspension that contains 200 mg/5 mL when reconstituted. The physician wants the patient to receive 400 mg on the first day and 200 mg daily for the next 4 days.

a. How many mL of suspension will the patient take with the first dose?

\[ 10 \text{ mL} \]

b. What volume will the patient take each day thereafter?

\[ 5 \text{ mL every day for 4 days} \]

c. This product is available in 15-mL, 22.5-mL, and 30-mL sizes. Which size will last for the whole 5-day course?

\[ 30 \text{ mL} \]

5. You are making IVPB solutions. There are three different orders for gentamicin piggybacks. You have available a 30-mL vial of gentamicin 40 mg/mL.

a. What volume of gentamicin solution will you draw up in a syringe to make a 60 mg IVPB?

\[ 40 \text{ mg/1 mL} = \frac{60 \text{ mg}}{x} \]

\[ x = 1.5 \text{ mL} \]

b. What volume of gentamicin do you need to make a 100-mg piggyback bag?

\[ 40 \text{ mg/1 mL} = \frac{100 \text{ mg}}{x} \]

\[ x = 2.5 \text{ mL} \]

c. After making two 60-mg doses, one 100-mg dose, and three 80-mg doses, how much gentamicin will be left in the vial?

\[ 40 \text{ mg/mL} \times 30 \text{ mL/vial} = 1200 \text{ mg/vial} \]

\[ \text{Amount remaining} = 1200 \text{ mg} - \text{amount used} \]

\[ \text{Amount used} = 60 \text{ mg (2)} + 100 \text{ mg} + 80 \text{ mg (3)} = 460 \text{ mg used} \]

\[ 1200 \text{ mg} - 460 \text{ mg} = 740 \text{ mg remaining} \]

6. A female patient with a yeast infection comes to the pharmacy with a prescription for fluconazole tablets. She is to take 150 mg by mouth daily for 3 days. On the shelf in the pharmacy you find 100-mg tablets. The pharmacist asks the patient if she is willing to use the 100-mg tablets and she agrees.

a. How many tablets will you dispense?

\[ 4.5 \text{ tablets needed, so you must dispense 5 tablets} \]

b. How will the directions on the prescription read?

\[ \text{Take 1.5 tablets (150 mg) by mouth daily for 3 days} \]

7. Mrs. Berry is a frequent customer at Small’s Pharmacy. Her 7-month-old, 16-pound son has a fever of 103°F. She asks you to double-check her dose calculation, based on the dose of ibuprofen the pharmacist recommended of 10 mg/kg with a maximum of 4 doses/day.

a. How much ibuprofen should the baby receive per dose?

\[ 16 \text{ lb} \times \frac{1 \text{ kg}}{2.2 \text{ lb}} = 7.3 \text{ kg} \]

\[ 7.3 \text{ kg} \times 10 \text{ mg/kg} = 73 \text{ mg} \]
b. Mrs. Berry chooses ibuprofen children’s suspension, which contains 100 mg ibuprofen in 5 mL. What volume of ibuprofen will her son receive per dose in part A?

\[
\frac{100 \text{ mg}}{5 \text{ mL}} = \frac{73 \text{ mg}}{x}
\]

\[x = 3.7 \text{ mL (rounded)}\]

8. Convert the following weights to kilograms:
   a. 210 lb = 95.5 kg
   b. 14 pounds = 6.4 kg
   c. 181 lb = 82.3 kg
   d. 93 lb = 42.3 kg

9. Convert the following weights to pounds:
   a. 17.7 kg × 2.2 lb/kg = 39 lb
   b. 106 kg × 2.2 lb/kg = 233.2 lb
   c. 65 kg × 2.2 lb/kg = 143 lb
   d. 36 kg × 2.2 lb/kg = 79.2 lb

10. Determine the volume of each dose of the following insulin U100 orders:
    a. Lantus insulin, 22 units daily at HS
        0.22 mL
    b. NPH U-100 insulin, 45 units Q 12H
        0.45 mL
    c. Lispro insulin, 7 units before each meal
        0.07 mL

11. How many days will a 10-mL vial of insulin last, when used correctly, for each of the orders above?
    a. 1 day/0.22 mL (10 mL) = 45 days; however, insulin is only good for 28 days after opening
    b. 1 day/0.9 mL x 10 mL = 11 days
    c. 1 day/0.21 mL x 10 mL = 47 days; however, insulin is only good for 28 days after opening

12. Find the body surface area (BSA) for the heights and weights listed. If using an Internet calculator, round to the nearest hundredth.
    a. 5'9" and 168 lb
        1.92 m²
    b. 6'3" and 265 lb
        2.47 m²
    c. 5'2" and 131 kg
        2.23 m²
    d. 4'2" and 68 lb
        1.03 m²
    e. 96 cm and 16 kg
        0.64 m²

13. You need to prepare a syringe of heparin containing 22,500 units. The vial of heparin contains 10,000 units per mL. What volume of heparin will you draw up?

\[
\frac{10,000 \text{ units}}{1 \text{ mL}} = \frac{22,500 \text{ units}}{x}
\]

\[x = 2.25 \text{ mL}\]
14. If a patient buys a 16-ounce bottle of Pepto-Bismol and plans on taking two tablespoonfuls twice a day while he is traveling in Central America, how long will the bottle last him?

8 days

15. An oncologist has ordered vinblastine 4 mg/m² to be given every week by slow IV push. The patient weighs 115 pounds and is 62 inches tall. What is the weekly dose (mg) of vinblastine?

Patient’s BSA = 1.5 m²

\[ 1.51 \text{ m}^2 \times 4 \text{ mg/m}^2 = 6.04 \text{ mg or } 6.0 \text{ mg (rounded) vinblastine/week} \]

16. Annie Tyler is going to college and wants to take enough of her albuterol inhaler to last until she comes home at Thanksgiving, about 16 weeks. On average, she uses 2 puffs, 4 times each week. One canister provides around 200 inhalations. How many canisters will she need?

At 8 inhalations/week, one canister will last 25 weeks

17. There is a levothyroxine injection shortage and the hospital has four postoperative patients that need this medication. The pharmacy will draw up a syringe for the patients, but a new single-dose vial must be used each day. The doses are as follows: 125 mcg, 0.175 mg, 100 mcg, and 0.075 mg each day. Each vial contains 0.5 mg levothyroxine.

a. What is the total amount (in milligrams) of levothyroxine used each day?

\[ 125 \text{ mcg} = 0.125 \text{ mg}, 100 \text{ mcg} = 0.1 \text{ mg} \]

\[ \text{Total mg/day} = 0.125 \text{ mg} + 0.175 \text{ mg} + 0.1 \text{ mg} + 0.075 \text{ mg} = 0.475 \text{ mg} \]

b. The hospital has 8 vials left. How long will they last?

8 days

18. A pharmacy technician is making penicillin G 4-million unit piggyback bags. She has two full 20-mL vials of penicillin G that have been reconstituted to 500,000 units per mL. How many 4-million unit piggyback bags can she make?

5 bags

19. A prescriber orders acetaminophen 10-grain suppository for a bedridden hospice patient, whose husband comes in to pick up the medication. The pharmacy carries acetaminophen suppositories in 120-mg, 325-mg, and 650-mg strengths. Which strength should he purchase?

65 mg = 1 grain; therefore, 650 mg = 10 grains

20. Your mother has been recently diagnosed with diabetes and she needs help calculating her insulin dose. She is to take Humalog® 5 units before each meal and she is to add additional units if her blood sugar is elevated. Her goal blood sugar is 130. She is to add 1 unit for every 40 points over the goal. She is due to eat lunch and her blood sugar is 250. What dose of Humalog® should she inject?

\[ \text{Blood sugar of } 250 - \text{goal blood sugar of } 130 = \text{excess blood sugar of } 120 \]

\[ 120 \text{ points sugar excess} \times 1 \text{ unit/40 points excess} = 3 \text{ extra units} \]

\[ \text{Total Humalog® dose} = 5 \text{ usual units} + 3 \text{ units for excess} = 8 \text{ units} \]

For problems 21–24, refer to the case below:
A physician has ordered Trileptal® suspension 300 mg/5 mL for a boy with a seizure disorder. The child is to receive 10 mg/kg/day initially, in two
divided doses, with the dose to be increased gradually over time. The child weighs 44 pounds.

21. What is the child’s weight in kg, and how much Trileptal® will he receive initially, per day, and per dose?
   
   44 lb × 1 lb/2.2 kg = 20 kg
   20 kg × 10 mg/kg/day = 200 mg/day divided into 2 doses = 100 mg/dose

22. The physician orders that the boy’s dose of Trileptal be increased on the third day of treatment by 5 mg/kg/day divided in two doses. What is the new daily dose in mg/kg/day and how many mg Trileptal® does he receive per dose?
   
   15 mg/kg/day, 150 mg/dose

23. Eventually the child’s dose is increased until he is receiving Trileptal® suspension 600 mg BID. What volume will his mother measure to deliver a 600-mg dose of the medication?
   
   300 mg/5 mL = 600 mg/x; x = 10 mL

24. When the mother comes to the pharmacy to refill the Trileptal®, the new prescription reads as follows:

   Rx: Trileptal suspension 300 mg/5 mL, 1-month supply
   Sig: 600 mg BID

   What volume of the drug should the pharmacy supply to last 1 month?
   
   20 mL/day × 30 days = 600 mL

25. Tracy Tan is a 20-month-old girl with a serious bacterial infection. Her physician orders ceftriaxone 50 mg/kg/day, in two divided doses, to be started immediately. Tracy weighs 21.5 pounds.

   a. What is Tracy’s weight in kg?
      
      21.5 lb × 1 kg/2.2 lb = 9.8 kg

   b. How many mg of ceftriaxone will Tracy receive per day and per dose? Round the daily dose to the nearest 100 mg.
      
      9.8 kg × 50 mg/kg/day = 500 mg/day, 250 mg/dose

Chapter 11

1. Write the following as percents:

   a. 0.15
      
      15 parts per 100 or 15%

   b. 22/100
      
      22%

   c. 0.63
      
      63%

   d. 3/4
      
      0.75 or 75%

   e. 1.1
      
      110%

   f. 17/24
      
      0.71 or 71%
2. Write the following as percents:
   a. 0.75
      75%
   b. 33/100
      33%
   c. 0.81
      81%
   d. 5/8
      62.5%
   e. 1.2
      120%
   f. 3/25
      0.12%

3. From the labels shown, decide whether percentage strengths would be w/w or w/v.

   HYDROCORTISONE OINTMENT
   USP, 1%
   [Drug Facts]
   Active ingredients (in each gram) Purpose
   Hydrocortisone 10 mg Anti-itch
   Uses - for temporary relief of itching associated with minor skin irritations and rashes due to: eczema, insect bites, soaps and detergents, cosmetics, jewelry, seborrheic dermatitis, poison ivy, oak or sumac - for external genital, feminine and anal itching - other uses of this product should be only under the advice and supervision of a doctor.
   Uses
   For external use only
   Do not use in children under 2 years of age - if you have a vaginal discharge - for the treatment of diaper rash
   Dosage
   Ask a doctor before use if you have - external genital or feminine itching - external anal itching - bleeding
   When using this product - avoid contact with eyes - do not exceed the recommended daily dosage unless directed by a doctor - do not put this product into the rectum by using fingers or any mechanical devices or applicator
   Stop use and ask a doctor if condition worsens, or if symptoms persist for more than 7 days or clear up and occur again within a few days, stop use and do not begin use of any other hydrocortisone product.
   Keep out of reach of children.
   If swallowed, get medical help or contact a Poison Control Center right away.

   a. \( \text{mg/g} = \text{w/w} \)

   b. \( \text{g/mL} = \text{w/v} \)

   Source: Reprinted with permission of Hospira, Inc.
4. Write the following percents as ratios, including appropriate units:
   a. 5% (w/v)
      5 g/100 mL
   b. 24% (w/w)
      24 g/100 g
   c. 0.1% (v/v)
      0.1 mL/100 mL

5. Write the following percents as ratios, including appropriate units:
   a. 0.9% (w/v)
      0.9 g/100 mL
   b. 0.75% (v/v)
      0.75 mL/100 mL
   c. 10% (w/w)
      10 g/100 g
6. You dispense 480 mL of the KCl 10% liquid shown here. How many grams are in this volume of KCl oral solution?

48 g

POTASSIUM CHLORIDE ORAL SOLUTION, USP 10% SF ORANGE

Each 15 mL (tablespoonful) contains 20 mEq of potassium chloride (provided by potassium chloride 1.5 g), in a palatable, orange flavored, sugar free vehicle; alcohol 4.0%.

Inactive ingredients: Citric acid, FD&C Yellow #6, flavor, methylparaben, propylene glycol, propylparaben, purified water, saccharin sodium, sorbitol.

DOSEAGE AND ADMINISTRATION: See package insert for complete dosage recommendations.

MUST BE DILUTED.

DISPENSE in a tight, light-resistant container as defined in the USP/NF.

STORE at 20 to 25 C (68 to 77 F) (see USP Controlled Room Temperature).

AVOID FREEZING.

Rx only

NET: 1 PINT (473 mL)

7. How much pure ethanol is in 500 mL 70% (v/v) ethanol solution?

70%(v/v) = 70 mL/100 mL

70 mL/100 mL = x/500 mL

x = \(\frac{70 \text{ mL} (500 \text{ mL})}{100 \text{ mL}} = 350 \text{ mL}\)

8. The pure vanilla extract on Grandma’s shelf contains 35% ethyl alcohol. She has an 8-fl oz bottle.

a. How much alcohol is in 100 mL of vanilla extract?

35 mL/100 mL

b. How much alcohol is contained in the full 8-fl oz bottle?

8 fl oz = 240 mL  240 mL × 0.35 = 84 mL alcohol/8 ounces vanilla extract

9. You are asked to make 240 mL of 3% hydrogen peroxide from the available 6% hydrogen peroxide solution and sterile water for irrigation. How much of each ingredient is needed to make the preparation? (Note: 3% hydrogen peroxide is half as strong as 6%.)

120 mL of sterile water plus 120 mL of 6% hydrogen peroxide will make 240 mL of 3% hydrogen peroxide.

10. When you go in for a physical examination you learn that your blood glucose is normal at 77 mg/dL.

a. What is your blood sugar level in mg%?

77 mg/dL = 77 mg/100 mL
11. Dexamethasone for injection is available as 4 mg/mL and 10 mg/mL. What are the percent strengths of each product?

4 mg $\times$ 1 g/1000 mg = 0.004 g in each mL or 0.4 g/100 mL = 0.4%

10 mg $\times$ 1 g/1000 mg = 0.01 g; 0.01 g in each mL or 1 g/100 mL = 1%

12. Timolol ophthalmic drops are available in 0.25% and 0.5% concentrations.

a. How many milligrams of timolol are in a 10-mL bottle of 0.25% solution?

$0.25 \text{ g/100 mL} \times 10 \text{ mL/bottle} = 0.025 \text{ g/bottle} = 25 \text{ mg/bottle}$

b. How many milligrams of timolol are in a 15-mL bottle of 0.5% solution?

$0.5 \text{ g/100 mL} \times 15 \text{ mL/bottle} = 0.075 \text{ g/bottle} = 75 \text{ mg/bottle}$

13. It is a hot summer day in Southern California where you are vacationing, and you hear on the radio that carbon monoxide levels are above the healthy range at 11 PPM. Express this concentration as a percent and as a ratio.

$11 \div 1,000,000 = 0.00011\% \text{ or } 11 \text{ parts/1,000,000 parts}$

14. An injectable antibiotic is provided as 80 mg/2 mL. Write this ratio as a percent strength.

$40 \text{ mg/mL} = 4000 \text{ mg/100 mL} = 4 \text{ g/100 mL} = 4\%$

15. You are to compound one pound of 3% hydrocortisone cream from cream base and hydrocortisone powder.

a. How much hydrocortisone is contained in one pound of the cream?

$3\% = 3 \text{ g/100 g}; 1 \text{ lb} = 454 \text{ g}$

$3 \text{ g/100 g} = x/454 \text{ g}$

$x = \frac{3 \text{ g} \times (454 \text{ g})}{100 \text{ g}} = 13.62 \text{ g hydrocortisone in 1 lb of 3\% cream}$

b. How much of the cream base is needed for this product?

$454 \text{ g total} – 13.62 \text{ g hydrocortisone} = 440.38 \text{ g base}$

c. Is this a w/w or w/v problem?

w/w

16. A patient is receiving an IV of 5% dextrose in water. The dextrose solution is infusing at a rate of 125 mL every hour.

a. How many grams of dextrose will the patient receive in 1 hour?

$6.25 \text{ g/hour}$

b. How many grams of dextrose will the patient receive in 1 day?

$150 \text{ g/day}$

17. Bumetanide for injection contains bumetanide 1 mg/mL. What is the percent strength?

$1 \text{ mg/mL} = 100 \text{ mg/100 mL or } 0.1 \text{ g/100 mL} = 0.1\%$

18. A saline solution contains 2.25 grams sodium chloride in 250 mL. What is the percent strength of this solution?

$2.25 \text{ g/250 mL} = 0.9\%$

19. Mometasone cream contains 45 mg mometasone in 45 grams of cream. What percent strength is the cream?

$45 \text{ mg} \times 1 \text{ g/1000 mg} = 0.045 \text{ g}; 0.045 \text{ g/45 g} = 0.1\%$
20. What is the percent strength of benzalkonium chloride if equal parts of 2% and 6% benzalkonium chloride are mixed together?

4%

21. You are making a 1-liter intravenous solution with 250 mL of 50% dextrose and 750 mL of amino acids, electrolytes, and sterile water.

a. What is the final concentration of dextrose in the 1-liter bag?

\[
50\% = \frac{50 \text{ g}}{100 \text{ mL}}; \quad \frac{50\text{g}}{100 \text{ mL}} = x/250 \text{ mL}
\]

\[
x = 125 \text{ g dextrose. Final solution contains 125 g/1000 mL or 12.5% dextrose}
\]

b. Of the 750 mL added to the dextrose, 500 mL is 7% amino acids solution.

What is the final concentration of amino acids in 1 liter?

\[
7\% = \frac{7 \text{ g}}{100 \text{ mL}}; \quad \frac{7\text{g}}{100 \text{ mL}} = x/500 \text{ mL}
\]

\[
x = 35\text{g amino acid. Final solution contains 35 g/1000 mL or 3.5% amino acid}
\]

22. In the hospital pharmacy where you work, the pharmacist receives an order for 500 mL dextrose 10%. Unfortunately, this particular IV solution was not ordered and the pharmacy is out, but you do have dextrose 5% and dextrose 20%. How much of each solution is needed to make 500 mL of dextrose 10%?

Use the alligation alternate method to determine 10 parts of 5% dextrose and 5 parts of 20% dextrose/500 mL 10% dextrose.

333.3 mL of 5% dextrose and 166.7 mL of 20% dextrose = 500 mL of 10% dextrose.

23. The local veterinarian would like 10 mL of phenobarbital for injection in a 7.5% solution. You have on hand 65 mg/mL and 130 mg/mL.

a. What are the percent strengths of the 65 mg/mL and 130 mg/mL solutions for injection?

\[
65 \text{ mg/1 mL} = 6500 \text{ mg/100 mL or 6.5%}; \quad 130 \text{ mg/1 mL} = 13,000 \text{ mg/100 mL or 13%}
\]

b. How many mL of each strength phenobarbital for injection is needed to make 10 mL of 7.5% solution?

\[
\begin{array}{c|c}
6.5\% & 5.5 \text{ parts} \\
7.5\% & \\
13\% & 1 \text{ part} \\
6.5 \text{ parts} = 10 \text{ mL} \\
\end{array}
\]

\[
\frac{6.5 \text{ parts}}{10 \text{ mL}} = \frac{5.5 \text{ parts}}{x}
\]

\[
x = 8.46 \text{ mL of 6.5% phenobarbital injection}
\]

\[
\frac{6.5 \text{ parts}}{10 \text{ mL}} = \frac{1 \text{ part}}{y}
\]

\[
y = 1.54 \text{ mL of 13% phenobarbital solution}
\]
24. An antibiotic flush solution made by the hospital pharmacy contains vancomycin 25 mcg/mL and ciprofloxacin 2 mcg/mL. Write these concentrations as mg % strengths.

vancomycin 2.5 mg% and ciprofloxacin 0.2 mg%

25. Normal saline solution contains is a 0.9% sodium chloride (NaCl). Other saline solutions are known as ½ normal saline and ¼ normal saline, because they are ½ and ¼ the concentration of normal saline.

a. What is the percent strength of ½ normal saline?

0.9% × ½ = 0.45%

b. What is the percent strength of ¼ normal saline?

0.9% × ¼ = 0.225%

Chapter 12

1. You work in a compounding pharmacy where the elderly gastroenterologist sends his patients for his special GI upset capsules. Each capsule contains hyoscyamine 0.1 mg, bismuth subsalicylate 500 mg, and famotidine 10 mg. The pharmacist asks you to make 150 capsules. How much of each ingredient will you need?

Hyoscyamine – 150 × 0.1 mg = 15 mg
Bismuth subsalicylate – 150 × 500 mg = 75,000 mg = 75 grams
Famotidine – 150 × 10 mg = 1500 mg = 1.5 grams

2. Mrs. Rose Easkin brings in a prescription for 6 ounces of coal tar ointment. The coal tar formula makes 8 ounces. By what factor will you multiply each ingredient to reduce the formula from 8 ounces to 6 ounces?

6/8 or ¾.

3. Advil® Cold and Sinus Caplets each contain ibuprofen 200 mg and pseudoephedrine 30 mg. How much of each ingredient will the manufacturer use to make a bottle of 60 caplets?

Ibuprofen 60 × 200 mg = 12,000 mg = 12 grams
Pseudoephedrine 60 × 30 mg = 1800 mg = 1.8 grams

Answer questions 4–6 using the formula for mouthwash, below.

The hospital where you work prepares a mouthwash for patients with stomatitis (mouth sores) called “magic mouthwash” that contains the following:

Hydrocortisone 100 mg/2 mL 2 mL
Nystatin suspension 30 mL
Viscous lidocaine 2% 50 mL
Diphenhydramine elixir 12.5 mg/5 mL q.s a.d 240 mL

4. The pharmacist asks you to make 180 mL instead of 240 mL. By what factor will you reduce each ingredient to make the desired 180 mL?

180 mL/240 mL = 0.75

5. How much diphenhydramine elixir was necessary for the original formula?

Total volume – volume of all other ingredients = volume of diphenhydramine

240 mL – (2 mL + 30 mL + 50 mL) = 158 mL of diphenhydramine
6. How much of each ingredient will be used to make 180 mL of “magic mouthwash”?

- Hydrocortisone 100 mg/2 mL = 2 mL × 0.75 = 1.5 mL
- Nystatin suspension = 30 mL × 0.75 = 22.5 mL
- Viscous lidocaine 2% = 50 mL × 0.75 = 37.5 mL
- Diphenhydramine elixir = 118.5 mL

7. The children’s hospital where you work dilutes heparin flush 100 units/mL in normal saline for injection to make a special low-dose heparin flush syringe for newborns. The low-dose solution contains 1 unit heparin/mL and each syringe contains 0.5 mL. Your boss asks you to make 50 of these syringes.
   a. How much heparin is contained in 50 of the low-dose heparin flush syringes?
      
      \[ \text{1 unit/mL} \times 0.5 \text{ mL per syringe} \times 50 \text{ syringes} = 25 \text{ units in 50 syringes} \]
   b. How much of the heparin 100 units/mL will you use to make the dilute flush solution?
      
      \[ \frac{100 \text{ units/mL}}{x} = 25 \text{ units} \]
      \[ x = 0.25 \text{ mL of the heparin 100 units/mL for 50 syringes} \]
   c. How much normal saline for injection will you add to the heparin in Part b to make the dilute heparin flush solution?
      
      \[ 50 \text{ syringes} \times 0.5 \text{ mL per syringe} = 25 \text{ mL total solution} \]
      \[ 25 \text{ mL} - 0.25 \text{ mL of the heparin 100 unit/mL needed} = 24.75 \text{ mL of saline needed} \]

8. You need to measure 125 mg magnesium sulfate for a product you are compounding. The sensitivity rating of the balance is 10 mg and there is an acceptable error rate of 4%.
   a. What is the minimum weighable quantity for the magnesium sulfate?
      
      \[ \frac{SR \times 100}{\% \text{ error}} = MWQ \]
      
      \[ 250 \text{ mg} \]
   b. You are to dilute the magnesium sulfate with equal parts lactose powder. The pharmacist-in-charge tells you to make 500 mg of the mixture of magnesium sulfate and lactose. How much lactose will you need?
      
      \[ 250 \text{ mg} \]
   c. What aliquot will you measure out to contain the desired (125 mg) amount of magnesium sulfate?
      
      \[ 250 \text{ mg} \]

9. The sensitivity rating of your balance is 6 mg and the acceptable error rate is 3.5%. What is the minimum weighable quantity?

   \[ \frac{SR \times 100}{\% \text{ error}} = MWQ \]
   \[ \frac{6 \text{ mg} (100)}{3.5} = 171 \text{ mg} \]

10. Find the minimum weighable quantity for the following:
   a. Sensitivity rating = 4 mg, permissible error 4%

   \[ \frac{4 \text{ mg} \times 100}{4} = 100 \text{ mg} \]
b. Sensitivity rating = 2 mg, acceptable error rate 5%

\[
\frac{2 \text{ mg} \times 100}{5} = 40 \text{ mg}
\]

11. In the pediatrics unit of your hospital, a physician orders morphine for a patient who has undergone surgery and is in pain. The morphine is to be drawn up into a 10-mL syringe and administered via a pump that can deliver as little as 0.5 mL/hr. The orders are for morphine 0.25 mg per hour with instruction for the nurse to increase the dose as needed to a maximum of 0.75 mg per hour. The pharmacist tells you to use 10 mg/mL morphine diluted with normal saline to make 10 mL of morphine 0.5 mg/mL.

a. How much morphine is contained in 10 mL of morphine 0.5 mg/mL?

\[
0.5 \text{ mg/mL} = x/10 \text{ mL}
\]

\[
x = 5 \text{ mg}
\]

b. How much of the morphine 10 mg/mL is needed to make the dilute solution?

\[
10 \text{ mg/1 mL} = 5 \text{ mg/x}
\]

\[
x = 0.5 \text{ mL of the morphine sulfate 10 mg/mL concentration}
\]

c. How much normal saline will be used to make the dilute solution?

\[
10 \text{ mL total} - 0.5 \text{ mL morphine} = 9.5 \text{ mL of normal saline}
\]

d. What volume of the dilute solution contains 0.25 mg of morphine?

\[
0.5 \text{ mg/mL} = 0.25 \text{ mg/x}
\]

\[
x = 0.5 \text{ mL}
\]

12. A veterinarian orders a solution that contains 10 mg of an antibiotic in 20 mL of solution. The balance in the pharmacy has a sensitivity rating of 5 mg and the allowable error is 4%.

a. What is the minimum weighable quantity?

\[
5 \text{ mg} \times 100/4 = 125 \text{ mg}
\]

b. What total volume of solution will be needed to make the necessary final concentration?

\[
10 \text{ mg/20 mL} = 125 \text{ mg/x}; x = 250 \text{ mL}
\]

13. An antacid product contains 650 mg calcium carbonate and 500 mg sorbitol in each tablet. Each bottle contains 120 tablets. How much of each ingredient is needed to make 1000 bottles?

\[
120 \text{ tablets/bottle} \times 650 \text{ mg/tablet} \times 1000 \text{ bottles} = 78,000,000 \text{ mg} = 78,000 \text{ grams} = 78 \text{ kg}
\]

\[
120 \text{ tablets/bottle} \times 500 \text{ mg/tablet} \times 1000 \text{ bottles} = 60,000,000 \text{ mg} = 60,000 \text{ grams} = 60 \text{ kg}
\]

14. The density of a correctly compounded IV solution is 1.01 g/mL at room temperature. You will dispense 1 liter of the solution in an IV bag that, when empty, has a mass of 121 g.

a. What is the mass of 1 liter of the solution?

\[
1.01 \text{ g/mL} = x/1000 \text{ mL}
\]

\[
x = 1010 \text{ grams}
\]

b. What will the bag and the solution weigh together?

\[
1010 \text{ grams} + 121 \text{ grams} = 1131 \text{ grams for bag and solution}
\]
15. The density of mineral oil at 15°C is 0.76 g/mL and the density of water at the same temperature is 0.99 g/mL. What is the specific gravity of mineral oil?

\[ \frac{0.76 \text{ g/mL}}{0.99 \text{ g/mL}} = 0.77 \]

16. The volume of drug A is 15 mL and the weight is 16 grams. What is the density of drug A?

\[ \frac{16 \text{ g}}{15 \text{ mL}} = 1.07 \text{ g/mL} \]

17. You measure out 32 grams of anhydrous ferrous sulfate, which has a density of 2.8 g/cm³. What volume will this amount of ferrous sulfate fill?

\[ \frac{32 \text{ g}}{2.8 \text{ g/cm}^3} = 11.4 \text{ cm}^3 \]

18. In the pharmacy technology laboratory, Mary weighs out 260 mg of acetylsalicylic acid powder. Her lab partner Diane reweighs the powder on the more accurate electronic balance and finds the weight of the powder to be 264 mg. What is the percent error of the less accurate balance?

\[ \frac{4}{264} = \frac{x}{100} \]
\[ x = 1.52\% \]

19. Jocelyn uses a graduated cylinder to measure 45 mL of an oral solution. The pharmacist tells her to draw the solution up in a 60-mL syringe instead, because it will be more accurate. When she draws the solution up into the syringe, she sees that the volume is 42 mL.

a. What could account for the shortage?

The accuracy of the syringe or the accuracy of the graduated cylinder could account for the shortage. A graduated cylinder is generally considered less accurate than a syringe.

b. Assuming that all the solution made it into the syringe, what is the percent error of the graduated cylinder Jocelyn originally used?

\[ \frac{3 \text{ mL}}{42 \text{ mL}} = \frac{x}{100} = 7.1\% \]

20. A solution weighs 84 g and fills a 100-mL vial. What is its density?

\[ \frac{84 \text{ g}}{100 \text{ mL}} = 0.84 \text{ g/mL} \]

21. At room temperature, 99% ethanol has a density of 0.83 g/mL. You have an 8-fluid ounce and a pint bottle. Which bottle will you choose to hold 265 g of ethanol?

\[ \frac{265 \text{ g}}{0.83 \text{ g/mL}} = 220 \text{ mL} \]

8 fl oz × 30 mL/fl oz = 240 mL; 1 pint = 16 fl oz or 480 mL. Therefore, use the 8-fl oz bottle.

22. You are asked to make Dakin’s ½ strength solution for a patient with a wound. The formula calls for 952 mL sterile water for irrigation and 48 mL sodium hypochlorite 5.25% solution (bleach) and you need 250 mL for the day.

a. How much Dakin’s ½ strength does the formula make?

952 mL of water + 48 mL of bleach = 1000 mL of ½ strength Dakin’s solution.
b. How much of each ingredient do you need to make 250 mL of the solution?

- \[ \frac{48 \text{ mL}}{1000 \text{ mL}} = \frac{x}{250 \text{ mL}} \]
  \[ x = 12 \text{ mL of bleach} \]

- \[ \frac{952}{1000 \text{ mL}} = \frac{x}{250 \text{ mL}} \]
  \[ x = 238 \text{ mL of water for irrigation} \]

23. The dermatologist orders the following ointment frequently for her patients with seborrheic dermatitis:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precipitated sulfur</td>
<td>10 g</td>
</tr>
<tr>
<td>Salicylic acid</td>
<td>2.5 g</td>
</tr>
<tr>
<td>Water soluble ointment base</td>
<td>qs to 100 g</td>
</tr>
</tbody>
</table>

a. How much of each ingredient is needed to make 1 kg of ointment?

- \[ \frac{2.5 \text{ g}}{100 \text{ g}} = \frac{x}{1 \text{ kg}} \times \frac{1 \text{ kg}}{1000 \text{ g}} \]
  \[ x = 25 \text{ g of salicylic acid} \]

- \[ \frac{10 \text{ g}}{100 \text{ g}} = \frac{y}{1 \text{ kg}} \times \frac{1 \text{ kg}}{1000 \text{ g}} \]
  \[ y = 100 \text{ g of precipitated sulfur} \]

b. How much of each ingredient is necessary to make 454 grams?

- \[ \frac{2.5 \text{ g}}{100 \text{ g}} = \frac{x}{454 \text{ g}} \]
  \[ x = 11.35 \text{ g of salicylic acid} \]

- \[ \frac{10 \text{ g}}{100 \text{ g}} = \frac{y}{454 \text{ g}} \]
  \[ y = 45.4 \text{ g of precipitated sulfur} \]

24. Al Aiken brings in a prescription for 6 oz of the wintergreen sports rub shown in Figure 12-1.

a. By what factor will the weight of each ingredient be multiplied to make 6 oz of the sports rub?

- \[ 6 \text{ oz} = 170 \text{ g}; \frac{170}{100} = 1.7 \]

b. How many grams of each ingredient is needed to make 6 oz?

1. Methyl Salicylate \( 30 \text{ g}(1.7) = 51 \text{ g} \)
2. Menthol \( 7.5 \text{ g}(1.7) = 12.75 \text{ g} \)
3. Lanolin \( 7.5 \text{ g}(1.7) = 12.75 \text{ g} \)
4. White petrolatum \( 55 \text{ g}(1.7) = 93.5 \text{ g} \)

25. The density of corn oil at room temperature is 0.92 g/mL. Of a quart, pint, and half-gallon capacity bottle, which would best contain the volume of 1 kg of corn oil?

- \[ 0.92 \text{ g/mL} = \frac{1000 \text{ g}}{x} \]
  \[ x = 1087 \text{ mL}, \text{ requires } \frac{1}{2} \text{ gal} \]

Chapter 13

1. A vial of cefazolin for IV use is reconstituted with 45 mL of fluid and contains 50 mL of cefazolin 1 g/5 mL when correctly reconstituted.

   a. What volume does the dry powder displace?

   \[ 50 \text{ mL} - 45 \text{ mL} = 5 \text{ mL displaced by powder} \]

   b. How many grams of cefazolin are in the vial?

   \[ 1 \text{ g/5 mL} \times 50 \text{ mL} = 50 \text{ g/5} = 10 \text{ g} \]

   c. To prepare a 2 g dose, what volume will be withdrawn?

   \[ 1 \text{ g/5 mL} = 2 \text{ g/x} \]

   \[ x = 10 \text{ mL} \]
2. Gwen Tuphaz, P.T., prepared the above vial using 65 mL of fluid instead of 45 mL.
   a. What is the concentration of the incorrectly prepared cefazolin?
      \[65 \text{ mL} + 5 \text{ mL powder} = 70 \text{ mL total volume and 10 g cefazolin}\]
      \[1 \text{ g/7 mL}\]
   b. What volume contains the desired 2-g dose?
      \[14 \text{ mL}\]

3. The pharmacist prepares amoxicillin oral suspension that contains 500 mg/5 mL when correctly reconstituted. A full bottle contains 150 mL. How much amoxicillin is in a full bottle?
   \[500 \text{ mg/5 mL} = x/150\]
   \[x = 15,000 \text{ mg or 15 g}\]

4. A ceftriaxone vial directs you to add 3.6 mL of fluid to a 1-gram vial. The resulting solution contains 250 mg/mL.
   a. What is the total volume in the reconstituted vial?
      \[4 \text{ mL/vial}\]
   b. What volume does the dry powder displace?
      \[0.4 \text{ mL}\]

5. Nurse Nancy calls you from the surgery unit to say that she mistakenly read the ceftriaxone reconstitution directions and added 5.6 mL lidocaine 1% instead of 3.6 mL. She is a new graduate and asks you what she should do. The ceftriaxone is for an IM injection in a woman who weighs 50 kg. You answer (choose the best answer):
   a. “I’m not certain. Let me look into it and call you back”
   b. “Let me get the pharmacist for you. Will you please hold?”
   c. “This medication is inexpensive, and it would be uncomfortable to inject 6 mL of fluid. I suggest you throw it away and start over.”

   Although all three answers are correct, it is not within the pharmacy technician’s scope of practice to provide answer C. If the nurse is in the middle of trying to prepare a medication, answer B, which should provide a faster response, is the best answer.

6. The directions for reconstitution of pantoprazole 40 mg for IV use state the vial is to be reconstituted with normal saline, but you just reconstituted it with a 5% dextrose solution. Should you use it anyway? Why or why not?
   No. “When in doubt, throw it out.”

7. You receive a drug order for 5% dextrose in water 1000 mL, plus 30 mEq KCl. A vial of KCl contains 2 mEq KCl/mL. What volume of KCl will you add to the 1000-mL bag?
   \[1 \text{ mL}/2 \text{ mEq} \times 30 \text{ mEq} = 15 \text{ mL}\]

8. While working at ABC Pediatric Pharmacy, you mistakenly reconstitute cephalexin for 100-mL oral suspension with 96 mL of water instead of 71. When correctly reconstituted, the suspension contains 250 mg/5 mL cephalexin.
   a. How much cephalexin does the bottle contain?
      \[5 \text{ g}\]
b. How much volume does the powder displace?
\[ 100 \text{ mL} - 71 \text{ mL} = 29 \text{ mL} \]
c. What is the concentration of the incorrectly reconstituted suspension?
\[ 40 \text{ mg}/1 \text{ mL} \]
d. What volume of the incorrectly mixed product contains 250 mg?
\[ 6.25 \text{ mL} \]

9. Normal saline contains 0.9% NaCl. How many mEq of sodium are there in a 100-mL bag of normal saline? Refer to Table 13-1 for equivalent weight of sodium chloride.
\[ 15.4 \text{ mEq/100 mL NS} \]

10. Sodium chloride is available in 1-g tablets. How many milliequivalents of sodium are in 1 tablet?
\[ 1000 \text{ mg/tablet} \times 1 \text{ mEq/58.5 mg} = 17.1 \text{ mEq/tab} \]

11. A patient receives one 50-mEq prefilled syringe of sodium bicarbonate IV during a code blue. One mEq of sodium bicarbonate weighs 84 mg. How many grams of sodium bicarbonate did the patient receive?
\[ 1 \text{ mEq/84 mg} = 50 \text{ mEq/x}; x = 4200 \text{ mg or 4.2 g} \]

12. A physician prescribes KCl 8-mEq tablets to be given three times a day. Unfortunately, only 10% KCl liquid is covered by the patient’s insurance. The pharmacist gets the okay for a switch to liquid, but wants you to calculate the dose for her to check. See Table 13-1.
   a. How many mL of 10% KCl contain 8 mEq?
   \[ 8 \text{ mEq/dose} \times 74.5 \text{ mg/1 mEq} \times 1 \text{ mL/100 mg} = 6 \text{ mL} \]
   b. The patient must dilute KCl before drinking it. Usually, 20 mEq is mixed in 4 ounces of juice or water. To mix 8 mEq in the same concentration, with what volume of juice or water will it be mixed?
   \[ 48 \text{ mL} \]

13. Prefilled sodium bicarbonate syringes, made especially to use in cardiac and respiratory emergencies for infants and young children, contain 10 mL of 4.2% sodium bicarbonate.
   a. How many mEq of sodium bicarbonate are in a syringe?
   \[ 4.2\% = 420 \text{ mg/10 mL} \times 1 \text{ mEq/84mg} \times 10 \text{ mL/syringe} = 5 \text{ mEq/syringe} \]
   b. How many mEq of sodium bicarbonate are in 1 mL of the solution?
   \[ 5 \text{ mEq/10 mL} = 0.5 \text{ mEq/1 mL} \]

14. The directions on all of the following IVPB bags indicate they should run in at a rate of 200 mL/hr. How long will each bag last?
   a. 50 mL IVPB
   \[ 15 \text{ minutes} \]
   b. 100 mL IVPB
   \[ 30 \text{ minutes} \]
   c. 150 mL IVPB
   \[ 45 \text{ minutes} \]
   d. 200 mL IVPB
   \[ 1 \text{ hour} \]
15. A physician orders that a patient receive 3000 mL of TPN fluids in a day.
   a. How many mL/hr will the patient receive?
      \[ 3000 \text{ mL} / 24 \text{ hr} = x / 1 \text{ hr} \]
      \[ x = 125 \text{ mL}, \text{ or } 125 \text{ mL/hr rate} \]
   b. The orders for the TPN are received and processed at 1700 hours. The next batch of IV solutions will be made in the morning and delivered at 0900 hours. How many bags will the technician need to make to last until morning?
      \[ 17 - 09 = 8 \text{ hours} \]
      \[ 125 \text{ mL/hr} \times 8 \text{ hours} = 1000 \text{ mL}, \text{ or one L bag} \]

16. At Little Hospital, near Tiny Town, Texas, the 40-bed hospital only owns six IV pumps. If a seventh patient needs an IV, the nurses use drip rates to set the infusion rate. The IV set delivers 20 gtts/mL, and the IV needs to run at 60 mL/hr.
   a. How many drops per hour will the patient receive?
      \[ 20 \text{ gtts/mL} \times 60 \text{ mL/hr} = 1200 \text{ gtts/hr} \]
   b. How many drops per minute will provide 60 mL/hr?
      \[ 1200 \text{ gtts/hr} \times 1 \text{ hr/60 min} = 20 \text{ gtts/min} \]

17. The physician orders a 500-mL bag of fluid to run in over 4 hours. How many mL/minute will the patient receive?
   \[ 500 \text{ mL/4 hours} = 125 \text{ mL/hr} \]
   \[ 125 \text{ mL/hr} \times 1 \text{ hr/60 min} = 2.1 \text{ mL/min} \]

18. The standard magnesium sulfate bags for obstetrics contain 20 g MgSO₄/500 mL of fluid. The order you receive for Mrs. Bertha Cummins for her pre-term labor are as follows:
   Initiate treatment with 4 g MgSO₄ to run in over 30 minutes. Follow with magnesium sulfate 2 g per hour.
   a. How many mL will contain the initial dose of 4 g?
      4 grams in 100 mL
   b. How long will the first 500-mL bag last?
      First 100 mL will last 30 minutes + remaining 400 mL will last 8 hours
      Total time 8.5 hours
   c. How long will subsequent 500-mL bags last?
      10 hours

19. The ICU pharmacist calls the central pharmacy to get a dopamine drip made for a patient. The standard concentration for dopamine drips in your hospital is 1600 mcg/mL. Dopamine is available as 40 mg/mL in a 5-mL vial. How much dopamine will you add to a 250-mL bag to achieve the standard concentration?
   \[ 1600 \text{ mcg/mL} = 1.6 \text{ mg/mL} \times 250 \text{ mL} = 400 \text{ mg dopamine/250 mL bag} \]
   \[ 40 \text{ mg/mL} = 400 \text{ mg/x} \]
   \[ x = 10 \text{ mL or 2 vials} \]
20. A few hours after you made the dopamine bag in Problem 19, the ICU pharmacist calls down to say the patient is getting worse. The pharmacist asks for a double concentration bag of the dopamine in a 100-mL bag. He asks you to bring the mixed bag, with your calculations to him right away, because the patient is critically ill.

a. How much dopamine will you add to 100 mL normal saline to make twice the concentration in Problem 19?

\[ 1600 \text{ mcg/mL} \times 2 = 3200 \text{ mcg/mL} = 3.2 \text{ mg dopamine/mL} \times 100 \text{ mL bag} = 320 \text{ mg} \times 1 \text{ mL/40 mg} = 8 \text{ mL} \]

b. If the double concentration bag is set to run at 400 mcg/min, how long will a 100-mL bag last?

\[ 400 \text{ mcg/minute} \times 60 \text{ min/hr} = 24,000 \text{ mcg/hr} = 24 \text{ mg/hr} \]

\[ 320 \text{ mg/bag} \times 1 \text{ hr/24 mg} = 13.3 \text{ hr for one bag} \]

21. A stat IV order is written for a dehydrated patient. The order reads “1000 mL NS + 20 KCl, run in over 4 hours, then 150 mL/hr for 6 hours, then 125 mL/hr.” After 6 hours the above orders are discontinued. How much normal saline has the patient received after 6 hours?

First 4 hours, 1000 mL, then 150 mL/hr \times 2 \text{ hours} = 1300 mL

22. The new orders for the patient in Problem 21 call for KCl 60 mEq/1000 mL NS. A vial of KCl contains 2 mEq/mL. How many mL of KCl will be added to the new bag?

\[ 2 \text{ mEq/mL} = 60 \text{ mEq/x} \]

\[ x = 30 \text{ mL} \]

23. The home health pharmacy prepares peripheral nutrition bags for 83-year-old Leanne Abed, who is recovering from burns she sustained when her kitchen caught fire. The IV infuses at a rate of 100 mL/hr. Mrs. Abed also receives antibiotics at midnight, 0600, 1200, and 1800. The TPN is turned off for 30 minutes every 6 hours while the antibiotics infuse. How much TPN does Mrs. Abed receive in 1 day?

\[ 100 \text{ mL/hr} \times 24 \text{ hr/day} = 2400 \text{ mL} \]

However, the IV is turned off for 2 hours each day, so 2400 mL – 200 mL = 2200 mL/day

24. The pharmacy usually delivers Mrs. Abed’s IV bags at noon, but today the delivery truck broke down. Her last bag was hung at 0700, and delivery is anticipated at 1800. Will she have enough fluid in the bag to keep it running until 1800?

\[ 1800 – 0700 = 11 \text{ hours time or 1100 mL and one IV bag contains 1000 mL} \]

Mrs. Abed’s IV will be turned off for 30 minutes at noon, but she will still run out unless the rate is changed.

25. Insulin drips are used to treat a serious condition in patients with poorly controlled diabetes, called diabetic ketoacidosis. In your hospital, the standard concentration of an insulin drip is 1 unit/mL in 100-mL bags. Patient Annie Sweet is in the ICU and an insulin drip is ordered. Annie receives 8 units/hr for 4 hours, then 6 units/hr for 3 hours, and for the last 7 hours has received 5 units/hour. How much fluid is left in Annie’s IV bag?

\[ 1 \text{ unit/mL}, \text{ so } 8 \text{ units/hr} = 8 \text{ mL/hr}; 8 \times 4 \text{ hr} = 32 \text{ mL}; 6 \text{ mL/hr} \times 3 \text{ hr} = 18 \text{ mL}; 5 \text{ mL/hr} \times 7 \text{ hr} = 35 \text{ mL} \]

Total used = 85 mL, 15 mL remaining.
Chapter 14

1. Joe’s Pharmacy buys 30 Lipitor® 80-mg tablets for $175.00 and sells those 30 tablets for $190.00. What is Joe’s gross profit on this transaction?

\[
\text{Profit} = \text{Sales} - \text{Cost} = 190.00 - 175.00 = 15.00
\]

2. Best Pharmacy buys 4 mg Avandaryl® at $350.00 per 100 tablets. Best then sells a bottle of 60 tablets for $300.00.

   a. What does it cost Best Pharmacy to buy 60 tablets?

\[
\text{Cost} = \frac{350.00}{100} \times 60 = 210.00
\]

   b. What is Best’s markup on the 60 tablets?

\[
\text{Markup} = \frac{300.00 - 210.00}{210.00} \times 100 = 42.86
\]

3. Good Neighbor Pharmacy buys 90 Naprosyn® 250-mg tablets for $16.00. Good Neighbor’s markup rate on this item is 25%. What is Good Neighbor’s selling price for 90 Naprosyn® 250-mg tablets?

\[
\text{Selling Price} = \frac{16.00 + 0.25(16.00)}{1 + 0.25} = 20.00
\]

4. Joe’s Pharmacy buys fluconazole 100 mg for $350.00 for 30 tablets. It costs Joe $5.00 to dispense 30 tablets. Joe sells a bottle of 30 tablets for $435.00. What is Joe’s net profit on this transaction?

\[
\text{Profit} = \text{Selling Price} - \text{Cost} - \text{Dispensing Cost} = 435.00 - 350.00 - 5.00 = 80.00
\]

5. Wholesale Rx Inc offers Best Pharmacy a 26% discount on Effexor® 25-mg tablets. The regular wholesale price for 120 Effexor® 25-mg tablets is $270.00. What price does Best Pharmacy pay for 120 Effexor® 25-mg tablets?

\[
\text{Discount Price} = 270.00 - 0.26(270.00) = 199.80
\]

6. The wholesaler, Meds R Us, offers Neighborhood Pharmacy 30 Nexium® 20-mg capsules for $165.00. The regular wholesale price for Nexium® 20-mg capsules is $195.00 for 30. What discount rate is Meds R Us offering?

\[
\text{Discount Rate} = \frac{165.00 - 195.00}{195.00} \times 100 = 15\%
\]

7. The regular price of Lipitor® 40 mg is $98.50 for 60 tablets. Joe gets a 14% discount when buying from the wholesaler Meds R Us.

   a. What price does Joe pay for 60 tablets of Lipitor® 40 mg?

\[
\text{Discount Price} = 98.50 - 0.14(98.50) = 84.71
\]

   b. It costs Joe $3.00 to dispense 60 tablets. Joe sells the 60 tablets for $95.48. What is Joe’s net profit on this sale?

\[
\text{Profit} = 95.48 - 84.71 - 3.00 = 7.77
\]

8. The Average Wholesale Price (AWP) for Drug D 60 mg is $150.00 for 30 tablets. Neighborhood Pharmacy can purchase Drug D 60 mg for $120.00 for 30 tablets. It costs the pharmacy $3.00 to dispense the tablets.

   a. How much does it cost Neighborhood Pharmacy to fill a prescription for 30 Drug D 60-mg tablets?

\[
\text{Cost} = 120.00 + 3.00 = 123.00
\]

   b. The customer’s insurance company will reimburse the pharmacy AWP + 4% + $4.00 dispensing fee. How much does the insurance company pay the pharmacy?

\[
\text{Insurance Payment} = 150.00 + 0.04(150.00) + 4.00 = 160.00
\]
c. What is Neighborhood Pharmacy’s profit in this transaction?
$37.00

9. The AWP for Actonel® 35 mg is $130.00 for 12 tablets. Joe’s Pharmacy can purchase Actonel® 35 mg for $115.00 for 12 tablets. It costs the pharmacy $2.00 to dispense the tablets.
   a. How much does it cost Joe’s Pharmacy to fill a prescription for 12 Actonel® 35-mg tablets?
      $115.00 + $2.00 = $117.00
   b. The customer's insurance company will reimburse the pharmacy AWP + 3% + $2.00 dispensing fee. How much does the insurance company pay the pharmacy?
      $130.00 + 0.03($130.00) + $2.00 = $135.90
   c. What is the pharmacy’s profit in this transaction?
      $135.90 – $117.00 = $18.90

10. The AWP for Diovan® 160 mg is $105.00 for 84 tablets. Joe’s Pharmacy can purchase Diovan® 160 mg for $100.00 for 84 tablets. It costs the pharmacy $2.00 to dispense the tablets.
   a. How much does it cost Joe’s Pharmacy to fill a prescription for 84 Diovan® 160-mg tablets?
      $102.00
   b. The customer's insurance company will reimburse the pharmacy AWP + 4% + $5.00 dispensing fee. How much does the insurance company pay the pharmacy?
      $114.20
   c. What is the pharmacy’s profit in this transaction?
      $12.20

11. The AWP for Levoxyl® 100 mcg is $54.00 for 100 tablets.
   a. What is the AWP per tablet?
      $\frac{54.00}{100} = $0.54
   b. What is the AWP for 30 Levoxyl® 100-mcg tablets?
      $0.54 \times 30 \text{ tablets} = $16.20

12. The AWP for Levoxyl® 100 mcg is $54.00 for 100 tablets. Joe’s Pharmacy can purchase 90 tablets for $45.00. It costs Joe $2.00 to dispense a prescription for 30 tablets. The insurance company will reimburse AWP + 3% + $3.00 dispensing fee. What is Joe’s profit in filling a prescription for 30 tablets of 100-mcg Levoxyl®?
    Joe’s cost: ($45.00/90 \text{ tablets}) \times 30 \text{ tablets} = $15.00
    Joe pays: $15.00 + $2.00 = $17.00
    Insurance pays: $16.20 + 0.03($16.20) + $3.00 = $19.69
    Joe’s profit: $19.69 – $17.00 = $2.69
13. In January, the staff at Joe’s Pharmacy performs an inventory and discovers that the value of the inventory is $75,000.00. Six months later another inventory is performed and the value is $60,000.00. What is the average inventory?

\[
\frac{\$75,000 + \$60,000}{2} = \$67,500 \text{ average inventory}
\]

14. In October, the staff at Neighborhood Pharmacy performs an inventory and discovers that the value of the inventory is $125,000.00. In April, another inventory is performed and the value is $99,000.00. What is the average inventory?

\[
\frac{\$125,000.00 + \$99,000.00}{2} = \$112,000.00
\]

15. In January, the staff at Joe’s Pharmacy performs an inventory and discovers that the value of the inventory is $80,000.00. Six months later another inventory is performed and the value is $100,000.00. Over the course of a year, Joe spends $360,000.00 purchasing items to sell at the pharmacy.

a. Find the average inventory value and the turnover rate.

\[\$90,000.00 = \text{inventory value}\]

\[\text{turnover rate} = 4\]

b. How long does it take to “turn over” the inventory?

3 months

16. The average inventory at Neighborhood Pharmacy is $70,000.00. Over the course of a year, Neighborhood spends $210,000.00 purchasing items to sell at the pharmacy. Find the turnover rate for Neighborhood Pharmacy.

\[
\frac{\$210,000.00}{\$70,000.00} = 3
\]

17. In January, the inventory value at Tom’s Pharmacy is $125,000.00. Six months later the inventory value is $120,000.00. Over the course of a year, Tom spends $367,500.00 on items to sell. How long does it take to “turn over” the inventory at Tom’s?

\[
\frac{\$125,000 + \$120,000}{2} = \$122,500 \text{ average inventory}
\]

\[
\text{Turnover rate} = \frac{\text{annual expenditures}}{\text{average inventory}}
\]

\[
\frac{\$367,500}{\$122,500} = 3 \text{ turns per year, or every 4 months}
\]

18. Joe’s Pharmacy buys a new automatic counter for $5000.00. The expected lifetime of the equipment is 6 years. The disposal value of the counter is $2400.00. Find the annual depreciation of the automatic counter.

\[
\frac{\$5000.00 - \$2400.00}{6 \text{ years}} = \$433.33/\text{year}
\]
19. Neighborhood Pharmacy buys new compounding software for $350.00. The estimated lifetime of the software is 5 years. The disposal value of the software is $0. Find the annual depreciation for the software.

\[ \text{Annual depreciation} = \frac{\text{total investment (cost)} - \text{disposal value}}{\text{estimated life}} \]

\[ \frac{$350 - $0}{5 \text{ years}} = $70.00/\text{year depreciation} \]

20. Tom’s Pharmacy buys an electronic scale for $1075.00. The expected life of the scale is 10 years. The disposal value is $475.00. Find the annual depreciation for the scale.

\[ \frac{$1075.00 - $475.00}{10 \text{ years}} = $60.00/\text{year} \]

21. Neighborhood Pharmacy invests in a new computer system at a cost of $12,000 for hardware and software. The life expectancy of their purchase is 6 years. The disposal value is estimated to be $750.00. Find the annual depreciation for their purchase.

\[ \frac{$12,000 - $750}{6 \text{ years}} = $1,875/\text{year} \]

22. Ralph’s Pretty Good Pharmacy purchases Pretty Good Sinus Medicine for $4.54/60 and sells them for $6.81/60.

a. What is Ralph’s markup?

$2.27

b. What is Ralph’s markup rate?

50%

23. The regular wholesale price for Enditch Ointment is $5.25/ounce. Ralph buys Enditch Ointment from Prescriptions R Us for $4.00/ounce.

a. What is the discount offered by Prescriptions R Us?

$5.25 – $4.00 = $1.25

b. What is the discount rate offered by Prescriptions R Us?

\[ \frac{$1.25}{5.25} \times 100\% = 24\% \]

24. Medicaid reimburses Small’s Pharmacy at 250% of the average acquisition cost of amoxicillin suspension plus a $4.35 professional fee. Small’s pays $2.45 for a 100-mL bottle and the average acquisition cost is $2.75. It costs Bud Small $2.50 to fill the prescription.

a. What are Bud’s total costs?

$4.95

b. What does Medicaid pay Bud?

$11.23

c. What is Bud’s net profit on the amoxicillin prescription?

$6.28
25. Blue Shield reimburses Small’s Pharmacy AWP plus a $7.50 professional fee for filling a generic prescription. The AWP for 100 furosemide 40-mg tablets is $17.80. Bud buys 100 furosemide tablets for $14.90, and his costs for filling the prescription is $3.25.

a. What is Bud’s profit when a patient has Blue Shield Insurance?

Bud’s costs = $14.90 + $3.25 = $18.15
Blue Shield pays $17.80 + $7.50 = $25.30
Bud’s profits = reimbursement – cost = $25.30 – $18.15 = $7.15

b. Bud usually sells 100 furosemide tablets for $24.50. How much less is Bud’s profit than in part a?

Bud’s costs = $18.15
Bud’s receipts on 100 furosemide 40 mg = $24.50
Bud’s usual profit = $24.50 – $18.15 = $6.35
Bud’s profit is $0.80 less.