

Chapter 2: Ratios and Percents

Review Set 2-1 (page 50)

$$1. \quad 3:150 = \frac{3}{150} = \frac{1}{50}$$

$$2. \quad 6:10 = \frac{6}{10} = \frac{3}{5}$$

$$3. \quad 0.05:0.15 = \frac{0.05}{0.15} = \frac{1}{3}$$

$$4. \quad 20:40 = \frac{20}{40} = \frac{1}{2} = \mathbf{0.5}$$

$$5. \quad \frac{1}{1000} : \frac{1}{150} = \frac{\frac{1}{1000}}{\frac{1}{150}} = \frac{1}{1000} \div \frac{1}{150} = \frac{1}{1000} \times \frac{150}{1} = \frac{3}{20} = \mathbf{0.15}$$

$$\begin{array}{r} 0.15 \\ 20 \overline{) 3.00} \\ \underline{20} \\ 100 \\ \underline{100} \\ 0 \end{array}$$

$$6. \quad 0.3:4.5 = \frac{0.3}{4.5} = \mathbf{0.07}$$

$$\begin{array}{r} 0.066 \\ 4.5 \overline{) 0.3000} \\ \underline{270} \\ 300 \\ \underline{270} \\ 30 \end{array}$$

$$7. \quad 1\frac{1}{2}:6\frac{2}{9} = \frac{1\frac{1}{2}}{6\frac{2}{9}} = 1\frac{1}{2} \div 6\frac{2}{9} = \frac{3}{2} \div \frac{56}{9} = \frac{3}{2} \times \frac{9}{56} = \frac{27}{112} = \mathbf{0.24}$$

$$\begin{array}{r} 0.241 \\ 112 \overline{) 27.000} \\ \underline{224} \\ 460 \\ \underline{448} \\ 120 \\ \underline{112} \\ 8 \end{array}$$

$$8. \quad 12:48 = \frac{12}{48} = \frac{1}{4} = 0.25 = \mathbf{25\%}$$

9. $0.08:0.64 = \frac{0.08}{0.64} = 0.125 = \mathbf{12.5\%}$

$$\begin{array}{r} 0.125 \\ 0.64 \overline{)0.08.000} \\ \underline{64} \\ 160 \\ \underline{128} \\ 320 \\ \underline{320} \\ 0 \end{array}$$

10. $7:10 = \frac{7}{10} = 0.7 = \mathbf{70\%}$

11. $50:100 = \frac{50}{100} = \mathbf{50\%}$

12. $45\% = \frac{45}{100} = \frac{9}{20}$

13. $0.5\% = 0.005 = \frac{5}{1000} = \frac{1}{200}$

14. $1\% = 0.01 = \frac{1}{100}$

15. $66\frac{2}{3}\% = \frac{200}{3}\% = \frac{200}{3} \div 100 = \frac{200}{3} \times \frac{1}{100} = \frac{2}{3}$

16. $2.94\% = 2.94 \div 100 = 0.0294 = \mathbf{0.03}$

17. $33\% = 33 \div 100 = \mathbf{0.33}$

18. $0.9\% = 0.9 \div 100 = 0.009 = \mathbf{0.01}$

19. $16\% = \frac{16}{100} = \frac{4}{25} = \mathbf{4:25}$

20. $25\% = \frac{25}{100} = \frac{1}{4} = \mathbf{1:4}$

21. $50\% = \frac{50}{100} = \frac{1}{2} = \mathbf{1:2}$

22. $0.9\% = 0.9 \div 100 = 0.009$
 $0.9 = \mathbf{0.900 \text{ is largest}}$
 $1:9 = \frac{1}{9} = 1 \div 9 = 0.110$
 $\frac{1}{90} = 1 \div 90 = 0.011$

23. $0.05 = 0.050$
 $\frac{200}{400} = 200 \div 400 = 0.5 = \mathbf{0.500 \text{ is largest}}$
 $0.025 = 0.025$
 $1:25 = \frac{1}{25} = 0.04 = 0.040 = 0.040$

$$\begin{array}{r} 0.5 \\ 400 \overline{)200} \\ \underline{200} \\ 0 \end{array}$$

$$\begin{array}{r} 0.04 \\ 25 \overline{)1.00} \\ \underline{100} \\ 0 \end{array}$$

24. $0.0125\% \div 100 = 0.000125$
 $0.25\% = 0.25 \div 100 = \mathbf{0.002500 \text{ is largest}}$
 $0.1\% = 0.1 \div 100 = 0.001000$
 $0.02\% = 0.02 \div 100 = 0.002000$

25. $\frac{1}{150} = 0.007$

$\frac{1}{300} = 0.003$

$0.5 = \mathbf{0.500 \text{ is largest}}$

$\frac{2}{3}\% = 0.067$

$$\begin{array}{r} 0.0066 \\ 150 \overline{)1.0000} \\ \underline{900} \\ 1000 \\ \underline{900} \\ 100 \end{array}$$

$$\begin{array}{r} 0.0033 \\ 300 \overline{)1.0000} \\ \underline{900} \\ 1000 \\ \underline{900} \\ 100 \end{array}$$

$\frac{2}{3}\% = \frac{2}{3} \div 100 = \frac{2}{3} \times \frac{1}{100} = \frac{2}{300}$

$$\begin{array}{r} 0.0066 \\ 300 \overline{)2.0000} \\ \underline{1800} \\ 2000 \\ \underline{1800} \\ 200 \end{array}$$

Review Set 2-2 (page 52)

1. $X = 0.25\% \times 520$
 $X = 0.0025 \times 520$
 $X = \mathbf{1.3}$

2. $X = 5\% \times 95$
 $X = 0.05 \times 95$
 $X = \mathbf{4.75}$

3. $X = 40\% \times 140$
 $X = 0.4 \times 140$
 $X = \mathbf{56}$

4. $X = 0.7\% \times 62$
 $X = 0.007 \times 62$
 $X = 0.434 = \mathbf{0.43}$

5. $X = 3\% \times 889$
 $X = 0.03 \times 889$
 $X = \mathbf{26.67}$

6. $X = 20\% \times 75$
 $X = 0.2 \times 75$
 $X = \mathbf{15}$

7. $X = 4\% \times 20$
 $X = 0.04 \times 20$
 $X = \mathbf{0.8}$
8. $X = 7\% \times 34$
 $X = 0.07 \times 34$
 $X = \mathbf{2.38}$
9. $X = 15\% \times 250$
 $X = 0.15 \times 250$
 $X = \mathbf{37.5}$
10. $X = 75\% \times 150$
 $X = 0.75 \times 150$
 $X = \mathbf{112.5}$
11. $X = 40\% \times 20$
 $X = 0.4 \times 20$
 $X = \mathbf{8 \text{ tablets}}$
12. $X = 60\% \times 1200$
 $X = 0.60 \times 1200$
 $X = \mathbf{720 \text{ mL}}$
13. $X = 80\% \text{ of } \$17\,651.07$
 $X = 0.8 \times \$17\,651.07$
 $X = \$14\,120.86$

| | |
|-------------------|---------------------------|
| \$ 17 651.07 | total bill |
| - 14 120.86 | paid by insurance company |
| <u>\$ 3530.21</u> | paid by patient |
14. $X = 40\% \times 750$
 $X = 0.4 \times 750$
 $X = \mathbf{300 \text{ g}}$
15. $X = 20\% \times 3500$
 $X = 0.2 \times 3500$
 $X = \mathbf{700 \text{ calories}}$

Practice Problems—Chapter 2 (pages 52–54)

1. $0.4, 40\%, 2:5$

$\frac{2}{5} = \frac{0.4}{1}$
 $5 \overline{) 2.0}$
 $\underline{20}$
 0

$0.4 \xrightarrow{\text{move decimal 2 places right}} 40\%$
2. $\frac{1}{20}, 5\%, 1:20$

$0.5 = \frac{5}{100} = \frac{1}{20}$

$0.05 \xrightarrow{\text{move decimal 2 places right}} 5\%$
3. $0.17, \frac{17}{100}, 17:100$

$17\% = \frac{17}{100} = 0.17$
4. $0.25, \frac{1}{4}, 25\%$

$1:4 = \frac{1}{4} = \frac{0.25}{1}$
 $4 \overline{) 1.00}$

$0.25 \xrightarrow{\text{move decimal 2 places right}} 25\%$

5. **0.06, $\frac{3}{50}$, 3:50**

$$6\% = \frac{6}{100} = \frac{3}{50}$$

$$6\% \rightarrow 06\% = 0.06$$

6. **0.17, 17%, 1:6**

$$\frac{1}{6} = \frac{0.166}{6 \overline{)1.000}}$$

$$\begin{array}{r} 6 \overline{)1.000} \\ \underline{6} \\ 40 \\ \underline{36} \\ 40 \\ \underline{36} \\ 4 \end{array}$$

$$0.166 = 0.17 \quad 0.17 = 17\%$$

7. **0.5, $\frac{1}{2}$, 1:2**

$$50\% = \frac{50}{100} = \frac{1}{2} = 1:2$$

$$50\% = 0.5$$

8. **0.01, $\frac{1}{100}$, 1%**

$$1:100 = \frac{1}{100}$$

$$1\% = 01\% = 0.01$$

9. **$\frac{9}{100}$, 9%, 9:100**

$$0.09 = \frac{9}{100}$$

$$0.09 \rightarrow 0.09 = 9\%$$

10. **0.38, 38%, 3:8**

$$\frac{3}{8} = \frac{0.375}{8 \overline{)3.000}}$$

$$\begin{array}{r} 8 \overline{)3.000} \\ \underline{24} \\ 60 \\ \underline{56} \\ 40 \\ \underline{36} \\ 4 \end{array}$$

$$0.375 = 0.38 \quad 0.38 = 38\%$$

11. **0.67, $\frac{2}{3}$, 67%**

$$2:3 = \frac{2}{3} = \frac{0.666}{3 \overline{)2.000}}$$

$$\begin{array}{r} 3 \overline{)2.000} \\ \underline{18} \\ 20 \\ \underline{18} \\ 20 \\ \underline{18} \\ 2 \end{array}$$

$$0.666 = 0.67 \quad 0.67 = 67\%$$

12. **0.33, 33%, 1:3**

$$\frac{1}{3} = \frac{0.333}{3 \overline{)1.000}}$$

$$\begin{array}{r} 3 \overline{)1.000} \\ \underline{9} \\ 10 \\ \underline{9} \\ 10 \\ \underline{9} \\ 1 \end{array}$$

$$0.333 = 0.33 \quad 0.33 = 33\%$$

13. $\frac{13}{25}$, 52%, 13:25

$$0.52 = \frac{52}{100} = \frac{13}{25}$$

$$0.52 \xrightarrow{\text{arrow}} 0.52 = 52\%$$

14. 0.45, $\frac{9}{20}$, 45%

$$9:20 = \frac{9}{20} = \frac{0.45}{20} \begin{array}{r} 0.45 \\ 20 \overline{) 9.00} \\ \underline{80} \\ 100 \\ \underline{100} \\ 0 \end{array}$$

$$0.45 \xrightarrow{\text{arrow}} 0.45 = 45\%$$

15. 0.86, 86%, 6:7

$$\frac{6}{7} = \frac{0.857}{7} \begin{array}{r} 0.857 \\ 7 \overline{) 6.000} \\ \underline{56} \\ 40 \\ \underline{35} \\ 50 \\ \underline{49} \\ 1 \end{array}$$

$$0.86 \xrightarrow{\text{arrow}} 0.86 = 86\%$$

16. 0.3, $\frac{3}{10}$, 30%

$$3:10 = \frac{3}{10} = \frac{0.3}{10} \begin{array}{r} 0.3 \\ 10 \overline{) 3.0} \end{array}$$

$$0.3 \xrightarrow{\text{arrow}} 0.3 = 30\%$$

17. 0.02, 2%, 1:50

$$\frac{1}{50} = \frac{0.02}{50} \begin{array}{r} 0.02 \\ 50 \overline{) 1.00} \\ \underline{100} \\ 0 \end{array}$$

$$0.02 \xrightarrow{\text{arrow}} 0.02 = 2\%$$

18. $\frac{3}{50}$, 6%, 3:50

$$0.06 = 6\% \xrightarrow{\text{arrow}}$$

$$0.06 = \frac{6}{100} = \frac{3}{50}$$

19. $\frac{1}{25}$, 4%, 1:25

$$0.04 = 4\% \xrightarrow{\text{arrow}}$$

$$4\% = \frac{4}{100} = \frac{1}{25}$$

20. 0.1, $\frac{1}{10}$, 1:10

$$10\% = \frac{10}{100} = \frac{1}{10}$$

$$\begin{array}{r} 0.1 \\ 10 \overline{) 1.0} \\ \underline{10} \\ 0 \end{array}$$

21. 1:25 = $\frac{1}{25}$ = 0.04

$$\begin{array}{r} 0.04 \\ 25 \overline{) 1.00} \\ \underline{100} \\ 0 \end{array}$$

22. $\frac{10}{400} = \frac{1}{40}$ = 1:40

23. 0.075 $\xrightarrow{\text{arrow}}$ 0.075 = 7.5%

24. 17:34 = $\frac{17}{34} = \frac{1}{2}$

$$25. 75\% = \frac{75}{100} = \frac{3}{4} = \mathbf{3:4}$$

$$\begin{array}{r} 26. X = 35\% \times 750 \\ X = 0.35 \times 750 \\ X = \mathbf{262.5} \end{array} \quad \begin{array}{r} 750 \\ \times 0.35 \\ \hline 3750 \\ 2250 \\ \hline 262.5 \end{array}$$

$$\begin{array}{l} 27. X = 7\% \times 52 \\ X = 0.07 \times 52 \\ X = \mathbf{3.64} \end{array}$$

$$\begin{array}{l} 28. X = 8.3\% \times 24 \\ X = 0.083 \times 24 \\ X = \mathbf{1.99} \end{array}$$

$$29. 1:40 = \frac{1}{40} = 0.025$$

$$\begin{array}{r} 0.025 \\ 40 \overline{) 1.000} \\ \underline{80} \\ 200 \\ \underline{200} \\ 0 \end{array}$$

$$1:400 = \frac{1}{400} = 0.0025$$

$$\begin{array}{r} 0.0025 \\ 400 \overline{) 1.0000} \\ \underline{800} \\ 2000 \\ \underline{2000} \\ 0 \end{array}$$

$$1:4 = \frac{1}{4} = 0.25$$

$$\begin{array}{r} 0.25 \\ 4 \overline{) 1.00} \\ \underline{8} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

1:4 is the strongest solution.

$$30. \frac{1}{10} = 0.1$$

$$\begin{array}{r} 0.1 \\ 10 \overline{) 1.0} \\ \underline{10} \\ 0 \end{array}$$

$$\frac{1}{200} = 0.005$$

$$\begin{array}{r} 0.005 \\ 200 \overline{) 1.000} \\ \underline{1000} \\ 0 \end{array}$$

$$\frac{1}{50} = 0.02$$

$$\begin{array}{r} 0.02 \\ 50 \overline{) 1.00} \\ \underline{100} \\ 0 \end{array}$$

$\frac{1}{10}$ is the strongest solution.

$$31. 1680 \times \frac{20}{400} = 1680 \times \frac{1}{20} = \frac{1680}{20} = \frac{168}{2} = \mathbf{84}$$

$$32. \frac{4}{75} \div \frac{1}{300} = \frac{4}{75} \times \frac{300}{1} = \frac{1200}{75} = \mathbf{16}$$

$$\begin{array}{r} 16 \\ 75 \overline{)1200} \\ \underline{75} \\ 450 \\ \underline{450} \\ 0 \end{array}$$

$$33. \frac{3}{15} \times 5 = \frac{15}{15} = \mathbf{1}$$

$$34. 2.2 \times 250 \div 500 = 550 \div 500 = \frac{550}{500} = \mathbf{1.1}$$

$$\begin{array}{r} 1.1 \\ 500 \overline{)550.0} \\ \underline{500} \\ 500 \\ \underline{500} \\ 0 \end{array}$$

$$35. 0.6 \times \frac{200}{1.2} = \frac{120}{1.2} = \mathbf{100}$$

$$\begin{array}{r} 100 \\ 1.2 \overline{)120.0} \\ \underline{12} \\ 000 \end{array}$$

$$36. 11\frac{7}{9} \times 3 = \frac{106}{9} \times 3 = \frac{318}{9} = \mathbf{35.33}$$

$$\begin{array}{r} 35.33 \\ 9 \overline{)318.00} \\ \underline{27} \\ 48 \\ \underline{45} \\ 30 \\ \underline{27} \\ 30 \\ \underline{27} \\ 3 \end{array}$$

$$37. \frac{1}{8} \div \frac{1}{3} \times 2 = \frac{1}{8} \times \frac{3}{1} \times 2 = \frac{3}{8} \times 2 = \frac{6}{8} = \mathbf{0.75}$$

$$\begin{array}{r} 0.75 \\ 8 \overline{)6.00} \\ \underline{56} \\ 40 \\ \underline{40} \\ 0 \end{array}$$

$$38. \frac{7}{4} \times 12 = \mathbf{21}$$

$$39. \frac{9}{0.6} \times 8 = \frac{72}{0.6} = \mathbf{120}$$

$$\begin{array}{r} 120 \\ 0.6 \overline{)72.0} \\ \underline{6} \\ 12 \\ \underline{12} \\ 00 \end{array}$$

$$40. \frac{0.4}{0.1} \times 22.5 = 4 \times 22.5 = \mathbf{90}$$

$$41. \frac{3}{8} \times 368 = \mathbf{138 \text{ nurses}}$$

$$\frac{1}{8} \times 368 = \mathbf{46 \text{ maintenance/cleaners}}$$

$$\frac{1}{4} \times 368 = \mathbf{92 \text{ technicians and 92 others}}$$

$$42. 125 \times 0.2 = \mathbf{25 \text{ g protein}}$$

$$\begin{array}{r} 125 \\ \times 0.2 \\ \hline 25.0 = 25 \end{array}$$

$$125 \times 0.05 = \mathbf{6.25 \text{ g fat}}$$

$$\begin{array}{r} 125 \\ \times 0.05 \\ \hline 6.25 = 6.25 \end{array}$$

$$43. 308 \times 0.75 = \mathbf{231 \text{ points needed to pass}}$$

$$\begin{array}{r} 308 \\ \times 0.75 \\ \hline 2156 \\ 1540 \\ \hline 231.00 \end{array}$$

$$44. \frac{27 \text{ minutes}}{90 \text{ calories}} \times 200 \text{ calories} = \frac{20 \times 27 \text{ minutes}}{9} = \frac{540 \text{ minutes}}{9} = \mathbf{60 \text{ minutes}}$$

$$45. 0.25 \times 200 = \mathbf{50 \text{ mL}}$$

$$\begin{array}{r} 200 \\ \times 0.25 \\ \hline 1000 \\ 400 \\ \hline 50.00 \end{array}$$

$$46. 60 \times 0.45 = \mathbf{27 \text{ mg}}$$

$$\begin{array}{r} 60 \\ \times 0.45 \\ \hline 300 \\ 240 \\ \hline 27.00 \end{array}$$

$$47. \frac{6.75 \text{ mg}}{1 \text{ minute}} \times 42 \text{ minutes} = 6.75 \text{ mg} \times 42 = \mathbf{283.5 \text{ mg of medication}}$$

$$\begin{array}{r} 6.75 \\ \times 42 \\ \hline 1350 \\ 2700 \\ \hline 283.50 \end{array}$$

$$48. 60 \text{ kg} \times 0.05 = \mathbf{3 \text{ kg}}$$

$$49. 0.17 \times \$12.56 = 2.14$$

$$\begin{array}{r} \$12.56 \\ - 2.14 \\ \hline \$10.42 \end{array}$$

50. $10\% \text{ of } 150 = 0.10 \times 150 = 15$

150 mg first dose

- 15

135 mg second dose

- 15

120 mg third dose

- 15

105 mg fourth dose

- 15

90 mg fifth dose

- 15

75 mg sixth dose

6 total doses