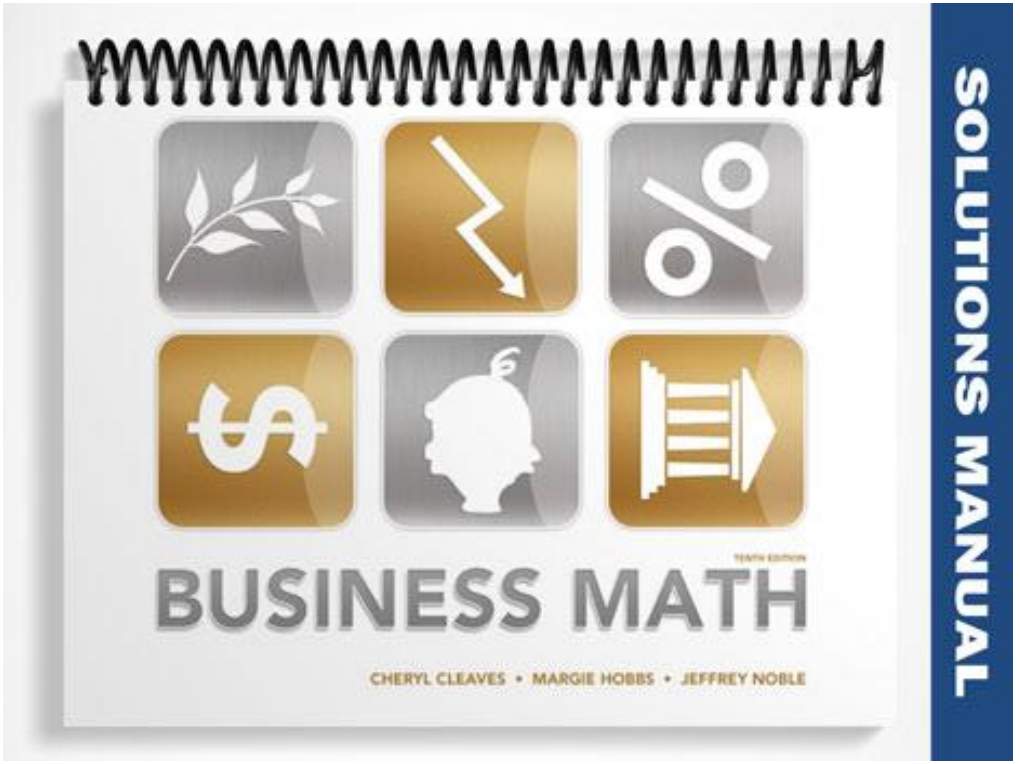
SOLUTIONS MANUAL
TENTH EDITION
BUSINESS MATH
CHERYL CLEAVES • MARGIE HOBBS • JEFFREY NOBLE

Chapter 2 Review of Fractions

Section Exercises

2-1, p. 49

1. proper **2.** improper **3.** improper **4.** proper **5.** proper **6.** improper

7. $7\overline{)12}$ $1\frac{5}{7}$, $\underline{7}$, 5

8. $20\overline{)21}$ $1\frac{1}{20}$, $\underline{20}$, 1

9. $18\overline{)18}$ 1, $\underline{18}$

10. $7\overline{)17}$ $2\frac{3}{7}$, $\underline{14}$, 3

11. $8\overline{)16}$ 2, $\underline{16}$

12. $16\overline{)387}$ $24\frac{3}{16}$, $\underline{32}$, 67, $\underline{64}$, 3

13. $\frac{1{,}300}{1{,}000} = \frac{13}{10} = 1\frac{3}{10}$ phones per person

14. $\frac{1{,}500}{1{,}000} = \frac{3}{2} = 1\frac{1}{2}$ phones per person

15. $(4 \times 6) + 1 = 25; \frac{25}{4}$

16. $(5 \times 27) + 2 = (135) + 2 = 137; \frac{137}{5}$

17. $(3 \times 2) + 1 = 7; \frac{7}{3}$

18. $(5 \times 3) + 4 = 19; \frac{19}{5}$

19. $(8 \times 1) + 5 = 13; \frac{13}{8}$

20. $(3 \times 6) + 2 = 20; \frac{20}{3}$

21. $\frac{12 \div 3}{15 \div 3} = \frac{4}{5}$

22. $\frac{12 \div 4}{20 \div 4} = \frac{3}{5}$

23. $\frac{20 \div 4}{24 \div 4} = \frac{5}{6}$

24. $\frac{18 \div 18}{36 \div 18} = \frac{1}{2}$

25. $\frac{24 \div 12}{36 \div 12} = \frac{2}{3}$

26. $\frac{13 \div 13}{39 \div 13} = \frac{1}{3}$

27. $\frac{400 \text{ million}}{9{,}000 \text{ million}} = \frac{2}{45}$

28. $\frac{4{,}000 \text{ million}}{24{,}000 \text{ million}} = \frac{1}{6}$

29. $21\overline{)36}$ 1 R15, $\underline{21}$, 15 — $15\overline{)21}$ 1 R6, $\underline{15}$, 6 — $6\overline{)15}$ 2 R3, $\underline{12}$, 3 — $3\overline{)6}$ 2 R0, $\underline{6}$, 0 — $3\overline{)6}$ 2, $\underline{6}$, 0

GCD $= 3$ $\frac{21}{36} = \frac{21 \div 3}{36 \div 3} = \frac{7}{12}$

30. $15\overline{)24}$ 1 R9, $\underline{15}$, 9 — $9\overline{)15}$ 1 R6, $\underline{9}$, 6 — $6\overline{)9}$ 1 R3, $\underline{6}$, 3 — $3\overline{)6}$ 2 R0, $\underline{6}$, 0

GCD $= 3$ $\frac{15}{24} = \frac{15 \div 3}{24 \div 3} = \frac{5}{8}$

31. $18\overline{)48}$ 2 R12, $\underline{36}$, 12 — $12\overline{)18}$ 1 R6, $\underline{12}$, 6 — $6\overline{)12}$ 2 R0, $\underline{12}$, 0

GCD $= 6$ $\frac{18}{48} = \frac{18 \div 6}{48 \div 6} = \frac{3}{8}$

32. $15\overline{)40}$ 2 R10, $\underline{30}$, 10 — $10\overline{)15}$ 1 R5, $\underline{10}$, 5 — $5\overline{)10}$ 2 R0, $\underline{10}$, 0

GCD $= 5$ $\frac{15}{40} = \frac{15 \div 5}{40 \div 5} = \frac{3}{8}$

33. $8\overline{)16}$ 2 $\frac{3 \times 2}{8 \times 2} = \frac{6}{16}$

34. $5\overline{)20}$ 4 $\frac{4 \times 4}{5 \times 4} = \frac{16}{20}$

35. $8\overline{)32}$ 4 $\frac{3 \times 4}{8 \times 4} = \frac{12}{32}$

36. $9\overline{)27}$ 3 $\frac{5 \times 3}{9 \times 3} = \frac{15}{27}$

37. $3\overline{)15}$ 5 $\frac{1 \times 5}{3 \times 5} = \frac{5}{15}$

38. $5\overline{)15}$ 3 $\frac{3 \times 3}{5 \times 3} = \frac{9}{15}$

2-2, p. 57

1.
$$\begin{array}{r} \frac{1}{9} \\ \frac{2}{9} \\ +\frac{5}{9} \\ \hline \frac{8}{9} \end{array}$$

2.
$$\begin{array}{r} \frac{7}{8} \\ +\frac{5}{8} \\ \hline \frac{12}{8} = 1\frac{4}{8} = 1\frac{1}{2} \end{array}$$

3.
$$\begin{array}{rl} \frac{5}{6} = & \frac{25}{30} \\ +\frac{7}{15} = & +\frac{14}{30} \\ \hline & \frac{39}{30} = 1\frac{9}{30} = 1\frac{3}{10} \end{array}$$

4.
$$\begin{array}{rl} \frac{5}{8} = & \frac{15}{24} \\ +\frac{7}{12} = & +\frac{14}{24} \\ \hline & \frac{29}{24} = 1\frac{5}{24} \end{array}$$

5.
$$\begin{array}{rl} 4\frac{5}{6} = & 4\frac{10}{12} \\ +7\frac{1}{2} = & +7\frac{6}{12} \\ \hline & 11\frac{16}{12} = 12\frac{4}{12} = 12\frac{1}{3} \end{array}$$

6.
$$\begin{array}{rl} 23\frac{5}{12} = & 23\frac{20}{48} \\ +48\frac{7}{16} = & +48\frac{21}{48} \\ \hline & 71\frac{41}{48} \end{array}$$

7.
$$\begin{array}{rl} 51\frac{5}{18} = & 51\frac{20}{72} \\ +86\frac{9}{24} = & +86\frac{27}{72} \\ \hline & 137\frac{47}{72} \end{array}$$

8.
$$\begin{array}{rl} 5\frac{7}{12} = & 5\frac{7}{12} \\ 3\frac{1}{4} = & 3\frac{3}{12} \\ +2\frac{2}{3} = & +2\frac{8}{12} \\ \hline & 10\frac{18}{12} = 11\frac{6}{12} = 11\frac{1}{2} \end{array}$$

9.
$$\begin{array}{rl} \frac{7}{8} = & \frac{21}{24} \\ 2\frac{3}{24} = & 2\frac{3}{24} \\ +6\frac{1}{6} = & +6\frac{4}{24} \\ \hline & 8\frac{28}{24} = 9\frac{4}{24} = 9\frac{1}{6} \end{array}$$

10.
$$\begin{array}{rl} 3\frac{5}{9} = & 3\frac{20}{36} \\ 5\frac{1}{12} = & 5\frac{3}{36} \\ +2\frac{2}{3} = & +2\frac{24}{36} \\ \hline & 10\frac{47}{36} = 11\frac{11}{36} \end{array}$$

11.
$$\begin{array}{r} \frac{7}{8} \\ -\frac{3}{8} \\ \hline \frac{4}{8} = \frac{1}{2} \end{array}$$

12.
$$\begin{array}{r} \frac{8}{9} \\ -\frac{2}{9} \\ \hline \frac{6}{9} = \frac{2}{3} \end{array}$$

13.
$$\begin{array}{rl} \frac{3}{4} = & \frac{21}{28} \\ -\frac{5}{7} = & -\frac{20}{28} \\ \hline & \frac{1}{28} \end{array}$$

14.
$$\begin{array}{rl} 9\frac{2}{3} = & 9\frac{4}{6} \\ -6\frac{1}{2} = & -6\frac{3}{6} \\ \hline & 3\frac{1}{6} \end{array}$$

15.
$$\begin{array}{rl} 15 = & 14\frac{9}{9} \\ -12\frac{7}{9} = & -12\frac{7}{9} \\ \hline & 2\frac{2}{9} \end{array}$$

16.
$$\begin{array}{rll} 21\frac{3}{5} = & 21\frac{6}{10} = & 20\frac{16}{10} \\ -12\frac{7}{10} = & -12\frac{7}{10} = & -12\frac{7}{10} \\ \hline & & 8\frac{9}{10} \end{array}$$

17.
$$\begin{array}{rl} 15\frac{8}{15} = & 15\frac{32}{60} \\ -7\frac{5}{12} = & -7\frac{25}{60} \\ \hline & 8\frac{7}{60} \end{array}$$

18.
$$\begin{array}{rlr} 23\frac{1}{8} = & 23\frac{3}{24} = & 22\frac{27}{24} \\ -\frac{7}{12} = & -\frac{14}{24} = & -\frac{14}{24} \\ \hline & & 22\frac{13}{24} \end{array}$$

19.
$$\begin{array}{r} 8\frac{1}{3} \\ -5 \\ \hline 3\frac{1}{3} \end{array}$$

20.
$$\begin{array}{rl} 12\frac{1}{5} = & 11\frac{6}{5} \\ -7\frac{4}{5} = & -7\frac{4}{5} \\ \hline & 4\frac{2}{5} \end{array}$$

21. $11\frac{3}{4} + 11\frac{3}{4} + 18\frac{5}{8} =$
$11\frac{6}{8} + 11\frac{6}{8} + 18\frac{5}{8} = 40\frac{17}{8} =$
$42\frac{1}{8}$ yards

22. $42\frac{3}{8} + 37\frac{5}{8} + 12\frac{3}{8} + 23\frac{3}{4} =$

$42\frac{3}{8} + 37\frac{5}{8} + 12\frac{3}{8} + 23\frac{6}{8} =$

$114\frac{17}{8} = 116\frac{1}{8}$ feet

23. $10\frac{3}{4} + 10\frac{3}{4} + 12\frac{5}{8} + 12\frac{5}{8} + 12\frac{5}{8}$

$+12\frac{5}{8} + 8\frac{1}{2} + 8\frac{1}{2} =$

$10\frac{6}{8} + 10\frac{6}{8} + 12\frac{5}{8} + 12\frac{5}{8} + 12\frac{5}{8}$

$+12\frac{5}{8} + 8\frac{4}{8} + 8\frac{4}{8} = 84\frac{40}{8} = 89$ feet

24. $4\frac{4}{5} + 4\frac{4}{5} + 4\frac{4}{5} + 7\frac{3}{8} + 7\frac{3}{8} =$

$4\frac{32}{40} + 4\frac{32}{40} + 4\frac{32}{40} + 7\frac{15}{40} + 7\frac{15}{40} =$

$26\frac{126}{40} = 29\frac{3}{20}$ inches

25. $45 - 42\frac{1}{8} = 44\frac{8}{8} - 42\frac{1}{8} =$

$2\frac{7}{8}$ yards; she can use the fabric.

26. $12 - 10\frac{3}{4} = 11\frac{4}{4} - 10\frac{3}{4} = 1\frac{1}{4}$ feet

27. $13\frac{15}{16} - 12\frac{5}{8} = 13\frac{15}{16} - 12\frac{10}{16} = 1\frac{5}{16}$ feet

$14\frac{1}{8} - 12\frac{5}{8} = 13\frac{9}{8} - 12\frac{5}{8} = 1\frac{4}{8} = 1\frac{1}{2}$ feet

$14 - 12\frac{5}{8} = 13\frac{8}{8} - 12\frac{5}{8} = 1\frac{3}{8}$ feet

$13\frac{13}{16} - 12\frac{5}{8} = 13\frac{13}{16} - 12\frac{10}{16} = 1\frac{3}{16}$ feet

28. $8\frac{3}{4} + 8\frac{3}{4} = 16\frac{6}{4} = 17\frac{2}{4} = 17\frac{1}{2}$

$36 - 17\frac{1}{2} = 35\frac{2}{2} - 17\frac{1}{2} = 18\frac{1}{2}$ inches

2-3, p. 64

1. $\frac{3}{\cancel{8}_{2}} \times \frac{\overset{1}{\cancel{4}}}{5} = \frac{3}{10}$

2. $\frac{5}{7} \times \frac{1}{6} = \frac{5}{42}$

3. $\frac{23}{4} \times \frac{35}{9} = \frac{805}{36} = 22\frac{13}{36}$

4. $\frac{3}{\cancel{8}_{1}} \times \frac{\overset{3}{\cancel{24}}}{1} = 9$

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

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

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

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

9. $5\frac{4}{7} = \frac{39}{7}; \frac{7}{39}$

10. $3\frac{3}{8} = \frac{27}{8}; \frac{8}{27}$

11. $\frac{5}{8} \div \frac{3}{4} = \frac{5}{\cancel{8}_{2}} \times \frac{\overset{1}{\cancel{4}}}{3} = \frac{5}{6}$

12. $\frac{3}{5} \div \frac{9}{10} = \frac{\overset{1}{\cancel{3}}}{\cancel{5}_{1}} \times \frac{\overset{2}{\cancel{10}}}{\cancel{9}_{3}} = \frac{2}{3}$

13. $2\frac{2}{5} \div 1\frac{1}{7} = \frac{12}{5} \div \frac{8}{7} = \frac{\overset{3}{\cancel{12}}}{5} \times \frac{7}{\cancel{8}_{2}} = \frac{21}{10} = 2\frac{1}{10}$

14. $5\frac{1}{4} \div 2\frac{2}{3} = \frac{21}{4} \div \frac{8}{3} = \frac{21}{4} \times \frac{3}{8} = \frac{63}{32} = 1\frac{31}{32}$

15. $\frac{3}{4} \div 5 = \frac{3}{4} \div \frac{5}{1} = \frac{3}{4} \times \frac{1}{5} = \frac{3}{20}$

16. $75 \div 1\frac{1}{8} = \frac{75}{1} \div \frac{9}{8} = \frac{\overset{25}{\cancel{75}}}{1} \times \frac{8}{\cancel{9}_{3}} = \frac{200}{3}$

$= 66\frac{2}{3}$, or 67 sheets

17. $200 \div 9\frac{3}{4} = 200 \div \frac{39}{4} = \frac{200}{1} \times \frac{4}{39} = \frac{800}{39}$

$= 20\frac{20}{39}$ rooms

18. $40 \div 8\frac{3}{4} = 40 \div \frac{35}{4} = \frac{\overset{8}{\cancel{40}}}{1} \times \frac{4}{\cancel{35}_{7}} = \frac{32}{7}$

$= 4\frac{4}{7}$; 4 boxes

19. $21 \div 3\frac{1}{2} = \frac{21}{1} \div \frac{7}{2} = \frac{\overset{3}{\cancel{21}}}{1} \times \frac{2}{\cancel{7}_{1}} = 6$

Theoretically, 6 cabinets will exactly fit on the wall.

20. $4 \times 18\frac{5}{8} = \frac{\overset{1}{\cancel{4}}}{1} \times \frac{149}{\cancel{8}_{2}} = \frac{149}{2} = 74\frac{1}{2}$ feet

21. $4 \times 4\frac{1}{8} = \frac{\overset{1}{\cancel{4}}}{1} \times \frac{33}{\underset{2}{\cancel{8}}} = \frac{33}{2} = 16\frac{1}{2}$ feet

Yes, if no more than a total of $\frac{1}{8}$ inch is needed for spacing between the desks.

22. $3\frac{1}{4} \times 2 = \frac{13}{4} \times \frac{2}{1} = \frac{13}{2} = 6\frac{1}{2}$ inches long

$28 \div 2 = 14$ inches wide

$6\frac{1}{2}$ inches long $\times$ 14 inches wide

Exercises Set A, p. 71

1. Examples will vary. $\frac{3}{5}, \frac{7}{9}, \frac{5}{8}, \frac{100}{301}, \frac{41}{53}$; proper fractions

2. Examples will vary. $\frac{4}{4}, \frac{8}{5}, \frac{12}{4}, \frac{132}{89}, \frac{7}{1}$; improper fractions

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

4. 7

5. $8\frac{1}{2}$

6. $\frac{(6 \times 5) + 5}{6} = \frac{35}{6}$

7. $\frac{(3 \times 4) + 1}{3} = \frac{13}{3}$

8. $\frac{(3 \times 33) + 1}{3} = \frac{100}{3}$

9. $\frac{15 \div 3}{18 \div 3} = \frac{5}{6}$

10. $\frac{20 \div 10}{30 \div 10} = \frac{2}{3}$

11. $\frac{30 \div 6}{48 \div 6} = \frac{5}{8}$

12. $\frac{5 \times 2}{6 \times 2} = \frac{10}{12}$

13. $\frac{5 \times 4}{8 \times 4} = \frac{20}{32}$

14. $\frac{9 \times 13}{11 \times 13} = \frac{117}{143}$

15. $\frac{15}{105} = \frac{3}{21} = \frac{1}{7}$ of the employees

16.
2)4 12 16
2)2 6 8
2)1 3 4
2)1 3 2
3)1 3 1
1 1 1

$2 \times 2 \times 2 \times 2 \times 3 = 48$

17.
2)56 24 12 42
2)28 12 6 21
2)14 6 3 21
3) 7 3 3 21
7) 7 1 1 7
1 1 1 1

$2 \times 2 \times 2 \times 3 \times 7 = 168$

18.
2)1 5 10 6
3)1 5 5 3
5)1 5 5 1
1 1 1 1

$2 \times 3 \times 5 = 30$

19. $\frac{3}{5} + \frac{4}{5} = \frac{7}{5} = 1\frac{2}{5}$

20. $\frac{2}{5} + \frac{2}{3} = \frac{6}{15} + \frac{10}{15} = \frac{16}{15} = 1\frac{1}{15}$

21. $7\frac{1}{2} + 4\frac{3}{8} = 7\frac{4}{8} + 4\frac{3}{8} = 11\frac{7}{8}$

22. $11\frac{5}{6} + 8\frac{2}{3} = 11\frac{5}{6} + 8\frac{4}{6} = 19\frac{9}{6} = 20\frac{3}{6} = 20\frac{1}{2}$

23. $12\frac{3}{8} + 16\frac{5}{8} = 28\frac{8}{8} = 29$ yards

24. $\frac{5}{12} - \frac{3}{12} = \frac{2}{12} = \frac{1}{6}$

25.
$7\frac{4}{5} = 7\frac{8}{10}$
$-4\frac{1}{2} = -4\frac{5}{10}$
$3\frac{3}{10}$

26.
$5 = 4\frac{5}{5}$
$-3\frac{2}{5} = -3\frac{2}{5}$
$1\frac{3}{5}$

27.
$4\frac{5}{6} = 4\frac{5}{6}$
$-3\frac{1}{3} = -3\frac{2}{6}$
$1\frac{3}{6} = 1\frac{1}{2}$

28.
$6 = 5\frac{8}{8}$
$-3\frac{5}{8} = -3\frac{5}{8}$
$2\frac{3}{8}$ feet

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

30. $\frac{5}{1} \times \frac{2}{3} = \frac{10}{3} = 3\frac{1}{3}$

31. $\frac{\overset{28}{\cancel{56}}}{\underset{1}{\cancel{9}}} \times \frac{\overset{1}{\cancel{9}}}{\underset{1}{2}} = 28$

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

33. 4

34. $3\frac{1}{4} = \frac{13}{4}; \frac{4}{13}$

35. $\frac{3}{4} \div \frac{1}{4} = \frac{3}{\cancel{4}_{1}} \times \frac{\overset{1}{\cancel{4}}}{1} = 3$

36. $7\frac{1}{2} \div 2 = \frac{15}{2} \div \frac{2}{1} = \frac{15}{2} \times \frac{1}{2} = \frac{15}{4} = 3\frac{3}{4}$

37. $3\frac{1}{7} \div 5\frac{1}{2} = \frac{22}{7} \div \frac{11}{2} = \frac{\overset{2}{\cancel{22}}}{7} \times \frac{2}{\cancel{11}_{1}} = \frac{4}{7}$

38. $244 \div 7\frac{5}{8} = \frac{244}{1} \div \frac{61}{8} = \frac{\overset{4}{\cancel{244}}}{1} \times \frac{8}{\cancel{61}_{1}} = 32$ pieces

39. $\frac{5}{8} + \frac{3}{4} - \frac{1}{8} = \frac{5}{8} + \frac{6}{8} - \frac{1}{8} = \frac{10}{8} = \frac{5}{4} = 1\frac{1}{4}$ inches

40. $\frac{2}{\cancel{3}_{1}} \times \frac{\overset{6}{\cancel{18}}}{1} = 12$ hours

41. $1 - \frac{1}{3} = \frac{3}{3} - \frac{1}{3} = \frac{2}{3}; \frac{2}{\cancel{3}_{1}} \times \frac{\overset{96}{\cancel{\$288}}}{1} = \$192$

Exercises Set B, p. 73

1.
$$\begin{array}{r} 3\ \tfrac{7}{15} \\ 15\overline{)52} \\ \underline{45} \\ 7 \end{array}$$

2.
$$\begin{array}{r} 20\ \tfrac{3}{4} \\ 4\overline{)83} \\ \underline{8} \\ 3 \\ \underline{0} \\ 3 \end{array}$$

3.
$$\begin{array}{r} 7 \\ 11\overline{)77} \\ \underline{77} \end{array}$$

4.
$$\begin{array}{r} 1\ \tfrac{9}{10} \\ 10\overline{)19} \\ \underline{10} \\ 9 \end{array}$$

5. $\frac{(8 \times 7) + 3}{8} = \frac{59}{8}$

6. $\frac{(5 \times 10) + 1}{5} = \frac{51}{5}$

7. $\frac{18 \div 2}{20 \div 2} = \frac{9}{10}$

8. $\frac{27 \div 9}{36 \div 9} = \frac{3}{4}$

9. $\frac{18 \div 9}{63 \div 9} = \frac{2}{7}$

10. $\frac{78 \div 6}{96 \div 6} = \frac{13}{16}$

11. $\frac{7 \times 9}{9 \times 9} = \frac{63}{81}$

12. $\frac{4 \times 7}{7 \times 7} = \frac{28}{49}$

13. $\frac{8}{30} = \frac{4}{15}$ of the class

14.
$$\begin{array}{r} 2\overline{)8\ 20\ 16} \\ 2\overline{)4\ 10\ 8} \\ 2\overline{)2\ 5\ 4} \\ 2\overline{)1\ 5\ 2} \\ 5\overline{)1\ 5\ 1} \\ 1\ 1\ 1 \end{array}$$
$2 \times 2 \times 2 \times 2 \times 5 = 80$

15.
$$\begin{array}{r} 2\overline{)8\ 9\ 12\ 24} \\ 2\overline{)4\ 9\ 6\ 12} \\ 2\overline{)2\ 9\ 3\ 6} \\ 3\overline{)1\ 9\ 3\ 3} \\ 3\overline{)1\ 3\ 1\ 1} \\ 1\ 1\ 1\ 1 \end{array}$$
$2 \times 2 \times 2 \times 3 \times 3 = 72$

16.
$$\begin{array}{r} 2\overline{)12\ 15} \\ 2\overline{)\ 6\ 15} \\ 3\overline{)\ 3\ 15} \\ 5\overline{)\ 1\ \ 5} \\ 1\ \ 1 \end{array}$$
$2 \times 2 \times 3 \times 5 = 60$

17. $\frac{7}{8} + \frac{1}{8} = \frac{8}{8} = 1$

18. $\frac{1}{4} + \frac{11}{12} + \frac{7}{16} =$
$\frac{12}{48} + \frac{44}{48} + \frac{21}{48} = \frac{77}{48} = 1\frac{29}{48}$

19. $3\frac{1}{4} + 2\frac{1}{3} + 3\frac{5}{6} =$
$3\frac{3}{12} + 2\frac{4}{12} + 3\frac{10}{12} =$
$8\frac{17}{12} = 9\frac{5}{12}$

20. $5\frac{3}{8} + 7\frac{1}{2} + 9\frac{3}{4} = 5\frac{3}{8} + 7\frac{4}{8} + 9\frac{6}{8}$
$= 21\frac{13}{8} = 22\frac{5}{8}$

21. $\frac{6}{7} - \frac{5}{14} = \frac{12}{14} - \frac{5}{14} =$
$\frac{7}{14} = \frac{1}{2}$

22.
$$\begin{array}{rrr} 4\frac{1}{2} = & 4\frac{7}{14} = & 3\frac{21}{14} \\ \underline{-3\frac{6}{7}} = & \underline{-3\frac{12}{14}} = & \underline{-3\frac{12}{14}} \\ & & \frac{9}{14} \end{array}$$

23. $12 = 11\frac{8}{8}$

$-4\frac{1}{8} = -4\frac{1}{8}$

$7\frac{7}{8}$

24. $4\frac{1}{5} = 4\frac{2}{10} = 3\frac{12}{10}$

$-2\frac{3}{10} = -2\frac{3}{10} = -2\frac{3}{10}$

$1\frac{9}{10}$

25. $7\frac{3}{4} = 7\frac{3}{4}$

$5\frac{1}{2} = 5\frac{2}{4}$

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

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

$8\frac{3}{4} = 8\frac{3}{4}$

$35\frac{10}{4} = 37\frac{2}{4} = 37\frac{1}{2}$ hours

$40 = 39\frac{2}{2}$

$-37\frac{1}{2} = -37\frac{1}{2}$

$2\frac{1}{2}$ hours

Maxine Ford worked $2\frac{1}{2}$ hours more than George Mackie.

26. $\frac{27}{40}$

27. $\frac{3}{7} \times \frac{8}{1} = \frac{24}{7} = 3\frac{3}{7}$

28. $\frac{\overset{1}{\cancel{9}}}{\underset{5}{\cancel{10}}} \times \frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{5}}} \times \frac{\overset{1}{\cancel{5}}}{\underset{1}{\cancel{9}}} \times \frac{3}{7} = \frac{3}{35}$

29. $10\frac{1}{2} \times 1\frac{5}{7} = \frac{\overset{3}{\cancel{21}}}{\underset{1}{\cancel{2}}} \times \frac{\overset{6}{\cancel{12}}}{\underset{1}{\cancel{7}}} = 18$

30. $10\frac{2}{3} \times \frac{3}{8} = \frac{\overset{4}{\cancel{32}}}{\underset{1}{\cancel{3}}} \times \frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{8}}} = 4$ cakes

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

32. $8 = \frac{8}{1}; \frac{1}{8}$

33. $2\frac{3}{8} = \frac{19}{8}; \frac{8}{19}$

34. $5\frac{1}{12} = \frac{61}{12}; \frac{12}{61}$

35. $\frac{5}{6} \div \frac{1}{8} = \frac{5}{\underset{3}{\cancel{6}}} \times \frac{\overset{4}{\cancel{8}}}{1} = \frac{20}{3} = 6\frac{2}{3}$

36. $15 \div \frac{3}{4} = \frac{\overset{5}{\cancel{15}}}{1} \times \frac{4}{\underset{1}{\cancel{3}}} = 20$

37. $7\frac{1}{2} \div 1\frac{2}{3} = \frac{15}{2} \div \frac{5}{3}$

$= \frac{\overset{3}{\cancel{15}}}{2} \times \frac{3}{\underset{1}{\cancel{5}}} = \frac{9}{2} = 4\frac{1}{2}$

38. $91 \div 1\frac{5}{8} = \frac{91}{1} \div \frac{13}{8} = \frac{\overset{7}{\cancel{91}}}{1} \times \frac{8}{\underset{1}{\cancel{13}}} = 56$ pieces

39. $1\frac{1}{5} + 2\frac{3}{4} + 1\frac{1}{2} = 1\frac{4}{20} + 2\frac{15}{20} + 1\frac{10}{20} = 4\frac{29}{20} = 5\frac{9}{20}$ feet

40. $8 - 2\frac{3}{16} = 7\frac{16}{16} - 2\frac{3}{16} = 5\frac{13}{16}$ feet

41. $8 \times 1\frac{5}{8} = \frac{\overset{1}{\cancel{8}}}{1} \times \frac{13}{\underset{1}{\cancel{8}}} =$ 13 feet

Practice Test, p. 75

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

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

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

4. $\frac{12 \div 3}{15 \div 3} = \frac{4}{5}$

5. $\frac{15 \div 5}{35 \div 5} = \frac{3}{7}$

6. $\frac{21 \div 3}{51 \div 3} = \frac{7}{17}$

7. $\frac{(8 \times 2) + 5}{8} = \frac{16 + 5}{8} = \frac{21}{8}$

8. $\frac{(12 \times 3) + 1}{12} = \frac{36 + 1}{12} = \frac{37}{12}$

9. $2\frac{3}{9} = 2\frac{1}{3}$

$9\overline{)21}$

$\underline{18}$

3

10. $13\overline{)56}$ = $4\frac{4}{13}$; 52; 4

11. $\frac{5}{6} - \frac{4}{6} = \frac{1}{6}$

12. $\frac{5}{8} + \frac{9}{10} = \frac{25}{40} + \frac{36}{40} = \frac{61}{40} = 1\frac{21}{40}$

13. $\frac{\cancel{5}^{1}}{8} \times \frac{7}{\cancel{10}_{2}} = \frac{7}{16}$

14. $\frac{5}{6} \div \frac{3}{4} =$

$\frac{5}{\cancel{6}_{3}} \times \frac{\cancel{4}^{2}}{3} = \frac{10}{9} = 1\frac{1}{9}$

15. $10\frac{1}{2} \div 5\frac{3}{4} =$

$\frac{21}{2} \div \frac{23}{4} =$

$\frac{21}{\cancel{2}_{1}} \times \frac{\cancel{4}^{2}}{23} =$

$\frac{42}{23} = 1\frac{19}{23}$

16. $56 \times 32\frac{6}{7} =$

$\frac{\cancel{56}^{8}}{1} \times \frac{230}{\cancel{7}_{1}} = 1{,}840$

17. $2\frac{1}{2} + 3\frac{1}{3} =$

$2\frac{3}{6} + 3\frac{2}{6} = 5\frac{5}{6}$

18. $137 - 89\frac{4}{5} =$

$136\frac{5}{5} - 89\frac{4}{5} = 47\frac{1}{5}$

19. $\frac{3}{3} =$ entire load

$\frac{3}{3} - \frac{1}{3} = \frac{2}{3}$ Part of the $\frac{3}{4}$ truckload to be unloaded

$\frac{\cancel{2}^{1}}{\cancel{3}_{1}} \times \frac{\cancel{3}^{1}}{\cancel{4}_{2}} = \frac{1}{2}$ of the truckload remains to be unloaded

20. $\frac{87}{580} = \frac{3}{20}$

21. $62\frac{1}{2} \div \frac{5}{8} =$

$\frac{125}{2} \div \frac{5}{8} =$

$\frac{\cancel{125}^{25}}{\cancel{2}_{1}} \times \frac{\cancel{8}^{4}}{\cancel{5}_{1}} = 100$ sheets

22. $5\frac{1}{2}\% + 2\frac{1}{4}\% =$

$5\frac{2}{4}\% + 2\frac{1}{4}\% = 7\frac{3}{4}\%$

23. $\frac{\$80}{\$200} = \frac{2}{5}$ The main course cost was $\frac{2}{5}$ of the total budget.

24. $1\frac{1}{4} \times \frac{900}{36} = \frac{5}{\cancel{4}_{1}} \times \frac{\cancel{900}^{225}}{36} = \frac{1{,}125}{36} = 31\frac{9}{36} = 31\frac{1}{4}$

The recipe for 900 cupcakes requires $31\frac{1}{4}$ cups of sugar.

Critical Thinking, p. 77

1. The two operations that require a common denominator are addition and subtraction.
2. The number 1 can be written as any fraction that has a denominator and numerator that are the same. $\frac{21}{21} = 1$
3. The product of any number and its reciprocal is 1. Examples will vary. $\frac{3}{5} \times \frac{5}{3} = 1$
4. Division requires the use of the reciprocal of a fraction. Answers will vary. One example is: $\frac{3}{7} \div \frac{8}{15} = \frac{3}{7} \times \frac{15}{8} = \frac{45}{56}$

5. The parts that are known must be added. The sum of the known parts is then subtracted from the total to give the one unknown part. Examples will vary. The deductions for a paycheck are: Withholding tax, \$261; Credit Union, \$100; Insurance, \$217; and Dues, \$15. The Social Security tax is not known. Find the Social Security tax if the deductions total \$680.

6. To find the reciprocal of a mixed number, first change the mixed number to an improper fraction by multiplying the denominator by the whole number and adding the numerator to get the numerator of the improper fraction. The denominator of the mixed number is the denominator of the improper fraction. Then, interchange the numerator and denominator of the improper fraction to make its reciprocal. $3\frac{1}{3} = \frac{10}{3}$; reciprocal $= \frac{3}{10}$

7. Two fractions are equal if the lowest terms of both fractions are the same.

$\frac{3}{7} \times \frac{2}{2} = \frac{6}{14} = \frac{3}{7}$

$\frac{3}{7} \times \frac{3}{3} = \frac{9}{21}; \frac{6}{14} = \frac{9}{21} = \frac{3}{7}$

Therefore, $\frac{6}{14}$ and $\frac{9}{21}$ are equivalent or equal fractions.

8. Answers will vary.

$12 \div \frac{1}{2} = 12 \times 2 = 24$

$12 \div \frac{3}{4} = \frac{\overset{4}{\cancel{12}}}{1} \times \frac{4}{\underset{1}{\cancel{3}}} = \frac{16}{1} = 16$

$15 \div \frac{2}{3} = \frac{15}{1} \times \frac{3}{2} = \frac{45}{2} = 22\frac{1}{2}$

9. A whole number, like 5, divided by a proper fraction, like $\frac{1}{2}$, means the wholes are being broken up into halves, so you have more parts (pieces) than you started with. $5 \div \frac{1}{2} = \frac{5}{1} \times \frac{2}{1} = 10$.

10. A proper fraction has a value that is less than 1 and an improper fraction has a value that is greater than or equal to 1.

11. The fraction in the minuend cannot be subtracted from the fraction in the subtractend. The minuend must be rewritten so the fraction has a larger numerator.

$12\frac{1}{4} = 11 + \frac{4}{4} + \frac{1}{4} = 11\frac{5}{4}$

$-7\frac{3}{4} \qquad -7\frac{3}{4}$

$4\frac{2}{4} = 4\frac{1}{2}$

The division should be written as a multiplication by the reciprocal of the divisor (second number).

$\frac{4}{9} \div 2\frac{1}{4} =$

$\frac{4}{9} \div \frac{9}{4} =$

$\frac{4}{9} \times \frac{4}{9} = \frac{16}{81}$

Challenge Problem p. 77

$25\frac{1}{2} \times 32\frac{3}{4} = \frac{51}{2} \times \frac{131}{4}$

$= \frac{6{,}681}{8} = 835\frac{1}{8}$ square feet

$\frac{6{,}681}{8} \div 9 = \frac{6{,}681}{8} \times \frac{1}{9} = \frac{6{,}681}{72}$ square yards

$\frac{6{,}681}{72} = 92\frac{19}{24}$

Because a portion of the 93rd square yard is needed, we will buy 93 yards and 4 additional yards for matching.

$93 + 4 = 97$

$97 \times 12 = \$1{,}164$

Case Studies

2-1, p. 78

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

$\frac{5}{2}\left(\frac{4}{1}\right) = \frac{20}{2} = 10$ cups apples

$\frac{5}{2}\left(\frac{1}{2}\right)$ cup $= \frac{5}{4} = 1\frac{1}{4}$ cups brown sugar

$\frac{5}{2}\left(\frac{1}{2}\right)$ tsp $= \frac{5}{4} = 1\frac{1}{4}$ tsp cinnamon

$\frac{5}{2}\left(\frac{1}{4}\right)$ tsp $= \frac{5}{8}$ tsp each nutmeg/cloves

$\frac{5}{2}\left(\frac{2}{1}\right)$ tsp $= \frac{10}{2} = 5$ tsp lemon juice

$\frac{5}{2}\left(\frac{2}{3}\text{ cup}\right) = \frac{10}{6} = 1\frac{2}{3}$ cups sugar

$\frac{5}{2}\left(\frac{1}{8}\text{ tsp}\right) = \frac{5}{16}$ tsp salt

$\frac{5}{2}\left(\frac{3}{4}\text{ cup}\right) = \frac{15}{8} = 1\frac{7}{8}$ cups flour

$\frac{5}{2}\left(\frac{1}{3}\text{ cup}\right) = \frac{5}{6}$ cup butter

$\frac{5}{2}\left(\frac{1}{4}\text{ cup}\right) = \frac{5}{8}$ cup walnuts

2. $4 \text{ cups} + 4 \text{ cups} = 8 \text{ cups apples}$

$\frac{1}{2} \text{ cup} + \frac{1}{2} \text{ cup} = 1 \text{ cup brown sugar}$

$\frac{1}{2} \text{ tsp} + \frac{1}{2} \text{ tsp} = 1 \text{ tsp cinnamon}$

$\frac{1}{4} \text{ tsp} + \frac{1}{4} \text{ tsp} = \frac{1}{2} \text{ tsp each nutmeg/cloves}$

$2 \text{ tsp} + 2 \text{ tsp} = 4 \text{ tsp lemon juice}$

$\frac{2}{3} \text{ cup} + \frac{2}{3} \text{ cup} = 1\frac{1}{3} \text{ cup sugar}$

$\frac{1}{8} \text{ tsp} + \frac{1}{8} \text{ tsp} = \frac{2}{8} = \frac{1}{4} \text{ tsp salt}$

$\frac{3}{4} \text{ cup} + \frac{3}{4} \text{ cup} = \frac{6}{4} = 1\frac{1}{2} \text{ cups flour}$

$\frac{1}{3} \text{ cup} + \frac{1}{3} \text{ cup} = \frac{2}{3} \text{ cup butter}$

$\frac{1}{4} \text{ cup} + \frac{1}{4} \text{ cup} = \frac{2}{4} = \frac{1}{2} \text{ cup walnuts}$

3. $\frac{1}{2} \text{ cup} \left(\frac{1}{2}\right) = \frac{1}{4} \text{ cup brown sugar}; \frac{1}{4}\left(\frac{3}{1}\right) = \frac{3}{4} \text{ cup for all 3 batches}$

$\frac{2}{3} \text{ cup} \left(\frac{1}{2}\right) = \frac{2}{6} = \frac{1}{3} \text{ cup granulated sugar}; \frac{1}{3}\left(\frac{3}{1}\right) = 1 \text{ cup for 3 batches}$

2-2, p. 79

1. $\$240{,}000 \times \frac{1}{2} = \frac{\$240{,}000}{1} \times \frac{1}{2} = \frac{\$240{,}000}{2} = \$120{,}000 \text{ materials}$

$\$240{,}000 \times \frac{1}{3} = \frac{\$240{,}000}{1} \times \frac{1}{3} = \frac{\$240{,}000}{3} = \$80{,}000 \text{ labor}$

$\$240{,}000 - (\$120{,}000 + \$80{,}000) = \$40{,}000 \text{ profit}$

or $\frac{40{,}000}{240{,}000} = \frac{1}{6}$ fraction of cost

2. $400 \text{ ft} \times 400 \text{ ft} = 160{,}000 \text{ square feet.}$

$\frac{40{,}000}{160{,}000} = \frac{1}{4}; \frac{5{,}000}{160{,}000} = \frac{1}{32}; \frac{10{,}000}{160{,}000} = \frac{1}{16}; \frac{80{,}000}{160{,}000} = \frac{1}{2}$

3. $160{,}000 - (40{,}000 + 5{,}000 + 10{,}000 + 80{,}000) = 25{,}000 \text{ square feet}$

$\frac{25{,}000}{160{,}000} = \frac{5}{32}$ is the portion that remains for a water garden