Chapter 2

2.1 Exercises

2. In a fraction, the numerator tells the number of parts we are interested in.

4. Answers may vary. An example is: I was late 3 out of 5 times last week. I was late $\frac{3}{5}$ of the time.

6. The number on the top, 8, is the numerator, and the number on the bottom, 13, is the denominator.

8. The number on the top, 5, is the numerator, and the number on the bottom, 16, is the denominator.

10. The number on the top, 1, is the numerator, and the number on the bottom, 19, is the denominator.

12. One out of two equal parts is shaded. The fraction is $\frac{1}{2}$.

14. Three out of ten equal parts are shaded. The fraction is $\frac{3}{10}$.

16. Two out of three equal parts are shaded. The fraction is $\frac{2}{3}$.

18. Three out of eight equal parts are shaded. The fraction is $\frac{3}{8}$.

20. One out of four equal parts is shaded. The fraction is $\frac{1}{4}$.

22. Four out of eleven equal parts are shaded. The fraction is $\frac{4}{11}$.

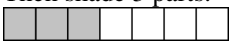
24. One out of eight equal parts is shaded. The fraction is $\frac{1}{8}$.

26. Five out of nine circles are shaded. The fraction is $\frac{5}{9}$.

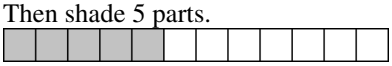
28. Seven out of twelve rectangles are shaded. The fraction is $\frac{7}{12}$.

30. Twelve out of fifteen circles are shaded. The fraction is $\frac{12}{15}$.

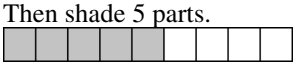
32. $\frac{3}{7}$; divide a rectangular bar into 7 equal parts. Then shade 3 parts.



34. $\frac{5}{12}$; divide a rectangular bar into 12 equal parts. Then shade 5 parts.



36. $\frac{5}{9}$; divide a rectangular bar into 9 equal parts. Then shade 5 parts.



38. $\frac{\text{sales tax}}{\text{total price}} = \frac{7}{98}$

40. $\frac{\text{amount used to repay}}{\text{total earnings}} = \frac{48}{167}$

42. $\frac{\text{local restaurants}}{\text{total}} = \frac{18}{37+18+24} = \frac{18}{79}$

44. $\frac{\text{puppies or adult dogs}}{\text{animals}} = \frac{12+25}{12+25+14+31} = \frac{37}{82}$

46. $\frac{\text{apartments in suburbs}}{\text{total apartments}} = \frac{223}{134+223+87+113} = \frac{223}{557}$

48. a. $\frac{\text{two or more}}{\text{total}} = \frac{213+56}{154+213+56+340} = \frac{269}{763}$

b. $\dfrac{\text{one or more}}{\text{total}} = \dfrac{154+213+56}{763} = \dfrac{423}{763}$

50. We cannot do it. Division by zero is undefined.

Cumulative Review

51.
$$\begin{array}{r} 18 \\ 27 \\ 34 \\ 16 \\ 125 \\ +\ 21 \\ \hline 241 \end{array}$$

52.
$$\begin{array}{r} 56,203 \\ -\ 42,987 \\ \hline 13,216 \end{array}$$

53.
$$\begin{array}{r} 3178 \\ \times\ \ 46 \\ \hline 19\,068 \\ 127\,12 \\ \hline 146,188 \end{array}$$

54.
$$\begin{array}{r} 1258 \text{ R } 4 \\ 24\overline{)30,196} \\ \underline{24} \\ 6\,1 \\ \underline{4\,8} \\ 1\,39 \\ \underline{1\,20} \\ 196 \\ \underline{192} \\ 4 \end{array}$$

Classroom Quiz 2.1

1. Five out of eight equal parts are shaded. The fraction is $\dfrac{5}{8}$.

2. $\dfrac{\text{number of fixed-rate mortgages}}{\text{total number of mortgages}} = \dfrac{213}{388}$

3. $\dfrac{\text{number who did not drive motorcycles}}{\text{total number of students}}$
$= \dfrac{5+10+17}{3+5+10+17}$
$= \dfrac{32}{35}$

2.2 Exercises

2. A prime number is a whole number greater than 1 that cannot be evenly divided except by itself and 1.

4. Every composite number can be written in exactly one way as a product of prime numbers.

6. $\dfrac{23}{135} = \dfrac{46}{270}$; answers may vary.

8. $21 = 3 \times 7$

10. $32 = 2 \times 16 = 2 \times 4 \times 4 = 2 \times 2 \times 2 \times 2 \times 2 = 2^5$

12. $66 = 6 \times 11 = 2 \times 3 \times 11$

14. $81 = 9 \times 9 = 3 \times 3 \times 3 \times 3 = 3^4$

16. $42 = 6 \times 7 = 2 \times 3 \times 7$

18. $48 = 4 \times 12$
$= 2 \times 2 \times 2 \times 6$
$= 2 \times 2 \times 2 \times 2 \times 3$
$= 2^4 \times 3$

20. $125 = 5 \times 25 = 5 \times 5 \times 5 = 5^3$

22. $99 = 9 \times 11 = 3^2 \times 11$

24. $135 = 27 \times 5 = 3^3 \times 5$

26. $216 = 8 \times 27 = 2^3 \times 3^3$

28. 31 is prime.

30. $51 = 3 \times 17$

32. 71 is prime.

34. $91 = 7 \times 13$

36. 97 is prime.

38. $119 = 7 \times 17$

40. $95 = 5 \times 19$

42. $143 = 11 \times 13$

44. $\frac{16}{24} = \frac{16 \div 8}{24 \div 8} = \frac{2}{3}$

46. $\frac{28}{49} = \frac{28 \div 7}{49 \div 7} = \frac{4}{7}$

48. $\frac{45}{75} = \frac{45 \div 15}{75 \div 15} = \frac{3}{5}$

50. $\frac{110}{140} = \frac{110 \div 10}{140 \div 10} = \frac{11}{14}$

52. $\frac{7}{21} = \frac{7 \times 1}{7 \times 3} = \frac{1}{3}$

54. $\frac{42}{56} = \frac{2 \times 3 \times 7}{2 \times 2 \times 2 \times 7} = \frac{3}{4}$

56. $\frac{65}{91} = \frac{5 \times 13}{7 \times 13} = \frac{5}{7}$

58. $\frac{42}{70} = \frac{2 \times 3 \times 7}{2 \times 5 \times 7} = \frac{3}{5}$

60. $\frac{35}{90} = \frac{5 \times 7}{5 \times 18} = \frac{7}{18}$

62. $\frac{72}{132} = \frac{72 \div 12}{132 \div 12} = \frac{6}{11}$

64. $\frac{125}{200} = \frac{25 \times 5}{25 \times 8} = \frac{5}{8}$

66. $\frac{200}{300} = \frac{2 \times 100}{3 \times 100} = \frac{2}{3}$

68. $\frac{210}{390} = \frac{30 \times 7}{30 \times 13} = \frac{7}{13}$

70. $\frac{10}{65} \stackrel{?}{=} \frac{2}{13}$

$10 \times 13 \stackrel{?}{=} 65 \times 2$

$130 = 130$

Yes

72. $\frac{24}{72} \stackrel{?}{=} \frac{15}{45}$

$24 \times 45 \stackrel{?}{=} 72 \times 15$

$1080 = 1080$

Yes

74. $\frac{70}{120} \stackrel{?}{=} \frac{41}{73}$

$70 \times 73 \stackrel{?}{=} 120 \times 41$

$5110 \neq 4920$

No

76. $\frac{18}{24} \stackrel{?}{=} \frac{23}{28}$

$18 \times 28 \stackrel{?}{=} 24 \times 23$

$504 \neq 552$

No

78. $\frac{52}{60} \stackrel{?}{=} \frac{39}{45}$

$52 \times 45 \stackrel{?}{=} 60 \times 39$

$2340 = 2340$

Yes

80. $\frac{360}{540 + 360 + 230 + 456} = \frac{360}{1586} = \frac{180 \times 2}{793 \times 2} = \frac{180}{793}$

$\frac{180}{293}$ of the graduates found their jobs through family and friends.

82. $\frac{89 + 11}{34 + 56 + 89 + 11} = \frac{100}{190} = \frac{10 \times 10}{19 \times 10} = \frac{10}{19}$.

$\frac{10}{19}$ of the recent graduates worked 22 hours or less per week.

84. $\frac{8400}{56,000} = \frac{3 \times 2800}{20 \times 2800} = \frac{3}{20}$

They have saved $\frac{3}{20}$ of the cost of the cabin.

86. Total number of students is
$1100 + 1700 + 900 + 500 + 300 = 4500$.

$\frac{900}{4500} = \frac{900 \div 900}{4500 \div 900} = \frac{1}{5}$

$\frac{1}{5}$ of the students have a medium commute.

88. $$\frac{1100+1700+900}{4500}=\frac{3700}{4500}=\frac{3700\div100}{4500\div100}=\frac{37}{45}$$

$\frac{37}{45}$ of the students consider their commute less than long.

Cumulative Review

89.
$$\begin{array}{r} 386 \\ \times\ 425 \\ \hline 1\,930 \\ 7\,72 \\ 154\,4 \\ \hline 164,050 \end{array}$$

90.
$$\begin{array}{r} 1296 \\ 12\overline{)15,552} \\ \underline{12} \\ 3\,5 \\ \underline{2\,4} \\ 1\,15 \\ \underline{1\,08} \\ 72 \\ \underline{72} \\ 0 \end{array}$$

91.
$$\begin{array}{r} 3200 \\ \times\ 300 \\ \hline 960,000 \end{array}$$

92.
$$\begin{array}{r} 2,734,603,864 \\ -\ 1,835,300,000 \\ \hline 899,303,864 \end{array}$$

Avatar generated \$899,303,864 more than *Titanic*.

Classroom Quiz 2.2

1. $\frac{77}{121}=\frac{7\times11}{11\times11}=\frac{7}{11}$

2. $\frac{42}{96}=\frac{2\times3\times7}{2\times2\times2\times2\times2\times3}=\frac{7}{16}$

3. $\frac{60}{135}=\frac{2\times2\times3\times5}{3\times3\times3\times5}=\frac{4}{9}$

2.3 Exercises

2. a. Divide the numerator by the denominator.

b. Write the quotient followed by the fraction with the remainder over the denominator.

4. $2\frac{3}{4}=\frac{2\times4+3}{4}=\frac{11}{4}$

6. $4\frac{6}{7}=\frac{4\times7+6}{7}=\frac{34}{7}$

8. $7\frac{7}{8}=\frac{7\times8+7}{8}=\frac{63}{8}$

10. $14\frac{1}{6}=\frac{14\times6+1}{6}=\frac{85}{6}$

12. $15\frac{4}{5}=\frac{15\times5+4}{5}=\frac{79}{5}$

14. $9\frac{5}{8}=\frac{9\times8+5}{8}=\frac{77}{8}$

16. $6\frac{6}{7}=\frac{6\times7+6}{7}=\frac{48}{7}$

18. $13\frac{5}{7}=\frac{13\times7+5}{7}=\frac{96}{7}$

20. $4\frac{1}{50}=\frac{4\times50+1}{50}=\frac{201}{50}$

22. $12\frac{5}{6}=\frac{12\times6+5}{6}=\frac{77}{6}$

24. $207\frac{2}{3}=\frac{207\times3+2}{3}=\frac{623}{3}$

26. $33\frac{1}{3}=\frac{33\times3+1}{3}=\frac{100}{3}$

28. $5\frac{19}{20}=\frac{5\times20+19}{20}=\frac{119}{20}$

30. $4\frac{3}{22}=\frac{4\times22+3}{22}=\frac{91}{22}$

32.
$$4\overline{)13}\quad \begin{array}{r}3\\ \underline{12}\\ 1\end{array}$$
$$\frac{13}{4}=3\frac{1}{4}$$

34.
$$5\overline{)9}\quad \begin{array}{r}1\\ \underline{5}\\ 4\end{array}$$
$$\frac{9}{5}=1\frac{4}{5}$$

36.
$$6\overline{)23}\quad \begin{array}{r}3\\ \underline{18}\\ 5\end{array}$$
$$\frac{23}{6}=3\frac{5}{6}$$

38.
$$5\overline{)80}\quad \begin{array}{r}16\\ \underline{5}\\ 30\\ \underline{30}\\ 0\end{array}$$
$$\frac{80}{5}=16$$

40.
$$13\overline{)42}\quad \begin{array}{r}3\\ \underline{39}\\ 3\end{array}$$
$$\frac{42}{13}=3\frac{3}{13}$$

42.
$$2\overline{)47}\quad \begin{array}{r}23\\ \underline{4}\\ 7\\ \underline{6}\\ 1\end{array}$$
$$\frac{47}{2}=23\frac{1}{2}$$

44.
$$17\overline{)54}\quad \begin{array}{r}3\\ \underline{51}\\ 3\end{array}$$
$$\frac{54}{17}=3\frac{3}{17}$$

46.
$$3\overline{)19}\quad \begin{array}{r}6\\ \underline{18}\\ 1\end{array}$$
$$\frac{19}{3}=6\frac{1}{3}$$

48.
$$10\overline{)83}\quad \begin{array}{r}8\\ \underline{80}\\ 3\end{array}$$
$$\frac{83}{10}=8\frac{3}{10}$$

50.
$$11\overline{)132}\quad \begin{array}{r}12\\ \underline{11}\\ 22\\ \underline{22}\\ 0\end{array}$$
$$\frac{132}{11}=12$$

52.
$$7\overline{)183}\quad \begin{array}{r}26\\ \underline{14}\\ 43\\ \underline{42}\\ 1\end{array}$$
$$\frac{183}{7}=26\frac{1}{7}$$

54.
$$9\overline{)196}\quad \begin{array}{r}21\\ \underline{18}\\ 16\\ \underline{9}\\ 7\end{array}$$
$$\frac{196}{9}=21\frac{7}{9}$$

56.
$$8\overline{)104}\quad \begin{array}{r}13\\ \underline{8}\\ 24\\ \underline{24}\\ 0\end{array}$$
$$\frac{104}{8}=13$$

58.
$$30\overline{)200}\quad \begin{array}{r}6\\ \underline{180}\\ 20\end{array}$$
$$\frac{200}{30}=6\frac{20}{30}=6\frac{2}{3}$$

60. $\frac{6}{8}=\frac{2\times3}{2\times4}=\frac{3}{4}$

$4\frac{6}{8}=4\frac{3}{4}$

62. $\frac{15}{90}=\frac{1\times15}{6\times15}=\frac{1}{6}$

$3\frac{15}{90}=3\frac{1}{6}$

64. $\frac{15}{75}=\frac{15\times1}{15\times5}=\frac{1}{5}$

$10\frac{15}{75}=10\frac{1}{5}$

66. $\frac{36}{4}=\frac{4\times9}{4}=9$

68. $\frac{63}{45}=\frac{9\times7}{9\times5}=\frac{7}{5}$

70. $\frac{112}{21}=\frac{7\times16}{7\times3}=\frac{16}{3}$

72.
$$360\overline{)390}\quad \begin{array}{r}1\\ \underline{360}\\ 30\end{array}$$
$$\frac{390}{360}=1\frac{30}{360}$$
$$\frac{30}{360}=\frac{1\times30}{12\times30}=\frac{1}{12}$$
$$\frac{390}{360}=1\frac{30}{360}=1\frac{1}{12}$$

74.
$$328\overline{)764}\quad \begin{array}{r}2\\ \underline{656}\\ 108\end{array}$$
$$\frac{764}{328}=2\frac{108}{328}$$
$$\frac{108}{328}=\frac{4\times27}{4\times82}=\frac{27}{82}$$
$$\frac{764}{328}=2\frac{108}{328}=2\frac{27}{82}$$

76.
$$1000\overline{)2150}\quad \begin{array}{r}2\\ \underline{2000}\\ 150\end{array}$$
$$\frac{2150}{1000}=2\frac{150}{1000}$$
$$\frac{150}{1000}=\frac{3\times50}{20\times50}=\frac{3}{20}$$
$$\frac{2150}{1000}=2\frac{150}{1000}=2\frac{3}{20}$$

78. $37\frac{5}{8}=\frac{37\times8+5}{8}=\frac{301}{8}$

The hallway is $\frac{301}{8}$ inches wide.

80.
$$4\overline{)459}\quad \begin{array}{r}114\\ \underline{4}\\ 05\\ \underline{4}\\ 19\\ \underline{16}\\ 3\end{array}$$
$$\frac{459}{4}=114\frac{3}{4}$$

They use $114\frac{3}{4}$ square yards of insulation backing each hour.

82.
$$\begin{array}{r} 156 \\ 4\overline{)627} \\ \underline{4} \\ 22 \\ \underline{20} \\ 27 \\ \underline{24} \\ 3 \end{array}$$

$\frac{627}{4} = 156\frac{3}{4}$

Nathaniel watches over $156\frac{3}{4}$ square miles of forest.

84. No; 157 is prime and is not a factor of 9810.

Cumulative Review

85.
$$\begin{array}{r} 1,398,210 \\ -\ 1,137,963 \\ \hline 260,247 \end{array}$$

86. $20{,}000 \times 100{,}000 = 2{,}000{,}000{,}000$

87. $300{,}000 \div 1000 = 300$

88. $\frac{156-98}{156} = \frac{58}{156} = \frac{2\times 29}{2\times 78} = \frac{29}{78}$

$\frac{29}{78}$ of his new e-mails were not spam.

Classroom Quiz 2.3

1. $3\frac{5}{16} = \frac{3\times 16+5}{16} = \frac{53}{16}$

2.
$$\begin{array}{r} 5 \\ 11\overline{)65} \\ \underline{55} \\ 10 \end{array}$$

$\frac{65}{11} = 5\frac{10}{11}$

3. $\frac{68}{17} = \frac{4\times 17}{1\times 17} = \frac{4}{1} = 4$

2.4 Exercises

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

4. $\frac{5}{8}\times\frac{3}{13} = \frac{5\times 3}{8\times 13} = \frac{15}{104}$

6. $\frac{7}{11}\times\frac{22}{35} = \frac{\cancel{7}^{1}}{\cancel{11}_{1}}\times\frac{\cancel{22}^{2}}{\cancel{35}_{5}} = \frac{2}{5}$

8. $\frac{22}{45}\times\frac{5}{11} = \frac{\cancel{22}^{2}}{\cancel{45}_{9}}\times\frac{\cancel{5}^{1}}{\cancel{11}_{1}} = \frac{2}{9}$

10. $\frac{9}{4}\times\frac{13}{27} = \frac{\cancel{9}^{1}}{4}\times\frac{13}{\cancel{27}_{3}} = \frac{13}{12}$ or $1\frac{1}{12}$

12. $\frac{12}{17}\times\frac{3}{24} = \frac{\cancel{12}^{1}}{17}\times\frac{3}{\cancel{24}_{2}} = \frac{3}{34}$

14. $\frac{8}{9}\times 6 = \frac{8}{9}\times\frac{6}{1} = \frac{8\times 2\times 3}{3\times 3} = \frac{8\times 2}{3} = \frac{16}{3}$ or $5\frac{1}{3}$

16. $5\times\frac{7}{25} = \frac{5}{1}\times\frac{7}{25} = \frac{\cancel{5}^{1}}{1}\times\frac{7}{\cancel{25}_{5}} = \frac{7}{5}$ or $1\frac{2}{5}$

18. $\frac{8}{7}\times\frac{5}{12}\times\frac{3}{10} = \frac{\cancel{8}^{\cancel{2}^{1}}}{7}\times\frac{\cancel{5}^{1}}{\cancel{12}_{\cancel{3}_{1}}}\times\frac{\cancel{3}^{1}}{\cancel{10}_{\cancel{2}_{1}}} = \frac{1}{7}$

20. $\frac{5}{7}\times\frac{15}{2}\times\frac{28}{15} = \frac{5\times 15\times 7\times 2\times 2}{7\times 2\times 15} = \frac{5\times 2}{1} = 10$

22. $\frac{5}{6}\times 3\frac{3}{5} = \frac{5}{6}\times\frac{18}{5} = \frac{3}{1} = 3$

24. $12\times 5\frac{7}{12} = \frac{12}{1}\times\frac{67}{12} = 67$

26. $0\times 6\frac{2}{3} = 0$

28. $\frac{5}{5}\times 11\frac{5}{7} = 1\times\frac{82}{7} = \frac{82}{7}$ or $11\frac{5}{7}$

30. $2\frac{3}{5}\times 1\frac{4}{7}=\frac{13}{5}\times\frac{11}{7}=\frac{143}{35}$ or $4\frac{3}{35}$

32. $4\frac{3}{5}\times\frac{1}{10}=\frac{23}{5}\times\frac{1}{10}=\frac{23}{50}$

34. $5\frac{1}{4}\times 4\frac{4}{7}=\frac{21}{4}\times\frac{32}{7}=\frac{3}{1}\times\frac{8}{1}=24$

36. $\frac{8}{9}\times 4\frac{1}{11}=\frac{8}{9}\times\frac{45}{11}=\frac{40}{11}$ or $3\frac{7}{11}$

38. $\frac{13}{12}\times\frac{96}{65}=\frac{13\times 8\times 12}{12\times 5\times 13}=\frac{8}{5}$ or $1\frac{3}{5}$

40. $2\frac{2}{9}\times 4\frac{1}{2}=\frac{20}{9}\times\frac{9}{2}=\frac{2\times 10\times 9}{9\times 2}=\frac{10}{1}=10$

42. $\frac{12}{17}\cdot x=\frac{144}{85}$

Since $12\cdot 12=144$ and $17\cdot 5=85$,

$\frac{12}{17}\cdot\frac{12}{5}=\frac{144}{85}$.

Thus, $x=\frac{12}{5}$.

44. $x\cdot\frac{11}{15}=\frac{77}{225}$

Since $7\cdot 11=77$ and $15\cdot 15=225$,

$\frac{7}{15}\cdot\frac{11}{15}=\frac{77}{225}$.

Therefore, $x=\frac{7}{15}$.

46. $22\frac{5}{8}\times 16\frac{1}{2}=\frac{22\times 8+5}{8}\times\frac{16\times 2+1}{2}$

$=\frac{181}{8}\times\frac{33}{2}$

$=\frac{5973}{16}$

$=373\frac{5}{16}$

The area of the tornado danger zone is $373\frac{5}{16}$ square miles.

48. $5\frac{1}{2}\times 63{,}400=\frac{11}{2}\times\frac{63{,}400}{1}$

$=\frac{11\times 2\times 31{,}700}{2\times 1}$

$=\frac{348{,}700}{1}$

$=348{,}700$

The house was worth \$348,700 in 2016.

50. $30\times 20\frac{1}{2}=\frac{30}{1}\times\frac{41}{2}=\frac{15\times 2\times 41}{2}=15\times 41=615$

615 square feet of carpet is needed.

52. $\frac{3}{5}\times 275=\frac{3}{5}\times\frac{275}{1}=\frac{3\times 5\times 55}{5\times 1}=\frac{165}{1}=165$

There are 165 subcompacts on the lot.

54. $\frac{7}{8}\times 36{,}000=\frac{7}{8}\times\frac{36{,}000}{1}$

$=\frac{7\times 8\times 4500}{8\times 1}$

$=\frac{31{,}500}{1}$

$=31{,}500$

Her present purchasing power is \$31,500.

56. $\frac{1470}{1}\times\frac{2}{3}\times\frac{1}{2}=\frac{3\times 490\times 2\times 1}{1\times 3\times 2}=\frac{490}{1}=490$

490 customers attend college and come to the restaurant at least three times per week.

58. There is an infinite number of answers. Any fraction that can be simplified to $\frac{3}{7}$ would be a correct answer. Thus three possible answers to this problem are $\frac{6}{14}$, $\frac{9}{21}$, or $\frac{12}{28}$.

Cumulative Review

59.
$$\begin{array}{r} 529 \\ 31\overline{)16{,}399} \\ \underline{155} \\ 89 \\ \underline{62} \\ 279 \\ \underline{279} \\ 0 \end{array}$$

The average number of cars using the bridge in one day is 529 cars.

60.
$$\begin{array}{r} 368 \\ 42\overline{)15,456} \\ \underline{12\,6} \\ 2\,85 \\ \underline{2\,52} \\ 336 \\ \underline{336} \\ 0 \end{array}$$

The average number of calls made per month by one salesperson is 368 calls.

61. $\dfrac{78-41}{78}=\dfrac{37}{78}$

$\dfrac{37}{78}$ of the cars were made in the United States.

62. $\dfrac{96-15}{96}=\dfrac{81}{96}=\dfrac{3\times 27}{3\times 32}=\dfrac{27}{32}$

$\dfrac{27}{32}$ of the class passed the first exam.

Classroom Quiz 2.4

1. $21\times\dfrac{5}{7}=\dfrac{21}{1}\times\dfrac{5}{7}=\dfrac{3\times 7}{1}\times\dfrac{5}{7}=\dfrac{3}{1}\times\dfrac{5}{1}=15$

2. $\dfrac{13}{15}\times\dfrac{5}{12}=\dfrac{13}{3}\times\dfrac{1}{12}=\dfrac{13}{36}$

3. $7\dfrac{2}{3}\times 1\dfrac{1}{5}=\dfrac{23}{3}\times\dfrac{6}{5}=\dfrac{23}{1}\times\dfrac{2}{5}=\dfrac{46}{5}$ or $9\dfrac{1}{5}$

2.5 Exercises

2. One way to think about it is to imagine how many $\dfrac{1}{3}$-pound rocks could be put in a bag that holds 2 pounds of rocks and then imagine how many $\dfrac{1}{2}$-pound rocks could be put in the same bag. The number of $\dfrac{1}{3}$-pound rocks would be larger. Therefore, $2\div\dfrac{1}{3}$ is a larger number.

4. $\dfrac{5}{11}\div\dfrac{7}{22}=\dfrac{5}{11}\times\dfrac{22}{7}=\dfrac{10}{7}$ or $1\dfrac{3}{7}$

6. $\dfrac{26}{7}\div\dfrac{13}{3}=\dfrac{26}{7}\times\dfrac{3}{13}=\dfrac{6}{7}$

8. $\dfrac{7}{15}\div\dfrac{9}{25}=\dfrac{7}{15}\times\dfrac{25}{9}=\dfrac{35}{27}$ or $1\dfrac{8}{27}$

10. $\dfrac{3}{4}\div\dfrac{2}{3}=\dfrac{3}{4}\times\dfrac{3}{2}=\dfrac{9}{8}$ or $1\dfrac{1}{8}$

12. $\dfrac{2}{7}\div\dfrac{2}{7}=\dfrac{2}{7}\times\dfrac{7}{2}=1$

14. $\dfrac{9}{14}\div\dfrac{1}{3}=\dfrac{9}{14}\times\dfrac{3}{1}=\dfrac{27}{14}$ or $1\dfrac{13}{14}$

16. $1\div\dfrac{3}{7}=1\times\dfrac{7}{3}=\dfrac{7}{3}$ or $2\dfrac{1}{3}$

18. $3\div\dfrac{5}{6}=\dfrac{3}{1}\times\dfrac{6}{5}=\dfrac{18}{5}$ or $3\dfrac{3}{5}$

20. $\dfrac{9}{16}\div 1=\dfrac{9}{16}\times 1=\dfrac{9}{16}$

22. $0\div\dfrac{5}{16}=0\times\dfrac{16}{5}=0$

24. $\dfrac{24}{29}\div 0$

Division by 0 is undefined.

26. $16\div\dfrac{8}{11}=\dfrac{16}{1}\times\dfrac{11}{8}=22$

28. $\dfrac{5}{6}\div\dfrac{12}{1}=\dfrac{5}{6}\times\dfrac{1}{12}=\dfrac{5}{72}$

30. $\dfrac{3}{4}\div\dfrac{9}{16}=\dfrac{3}{4}\times\dfrac{16}{9}=\dfrac{4}{3}$ or $1\dfrac{1}{3}$

32. $2\dfrac{2}{3}\div 4\dfrac{1}{3}=\dfrac{8}{3}\div\dfrac{13}{3}=\dfrac{8}{3}\times\dfrac{3}{13}=\dfrac{8}{13}$

34. $9\dfrac{1}{3}\div 3\dfrac{1}{9}=\dfrac{28}{3}\div\dfrac{28}{9}=\dfrac{28}{3}\times\dfrac{9}{28}=3$

36. $12,000\div\dfrac{3}{8}=\dfrac{12,000}{1}\times\dfrac{8}{3}=\dfrac{3\times 4000\times 8}{1\times 3}=32,000$

38. $\dfrac{\frac{5}{9}}{100} = \dfrac{5}{9} \div 100 = \dfrac{5}{9} \times \dfrac{1}{100} = \dfrac{1}{180}$

40. $\dfrac{\frac{3}{16}}{\frac{5}{8}} = \dfrac{3}{16} \div \dfrac{5}{8} = \dfrac{3}{16} \times \dfrac{8}{5} = \dfrac{3}{10}$

42. $4\dfrac{3}{4} \div \dfrac{1}{4} = \dfrac{19}{4} \div \dfrac{1}{4} = \dfrac{19}{4} \times \dfrac{4}{1} = 19$

44. $7\dfrac{5}{6} \times \dfrac{1}{2} = \dfrac{47}{6} \times \dfrac{1}{2} = \dfrac{47}{12}$ or $3\dfrac{11}{12}$

46.
$$\begin{aligned} 1\frac{7}{8} \div 3\frac{3}{4} &= \frac{15}{8} \div \frac{15}{4} \\ &= \frac{15}{8} \times \frac{4}{15} \\ &= \frac{15 \times 4 \times 1}{2 \times 4 \times 15} \\ &= \frac{1}{2} \end{aligned}$$

48. $7 \div 1\dfrac{2}{5} = \dfrac{7}{1} \div \dfrac{7}{5} = \dfrac{7}{1} \times \dfrac{5}{7} = \dfrac{5}{1} = 5$

50. $14\dfrac{2}{3} \div 3\dfrac{1}{2} = \dfrac{44}{3} \div \dfrac{7}{2} = \dfrac{44}{3} \times \dfrac{2}{7} = \dfrac{88}{21}$ or $4\dfrac{4}{21}$

52. $\dfrac{16}{3} \div 5\dfrac{1}{3} = \dfrac{16}{3} \div \dfrac{16}{3} = \dfrac{16}{3} \times \dfrac{3}{16} = 1$

54. $\dfrac{11}{20} \times 4\dfrac{1}{2} = \dfrac{11}{20} \times \dfrac{9}{2} = \dfrac{99}{40}$ or $2\dfrac{19}{40}$

56. $5\dfrac{5}{6} \div 7 = \dfrac{35}{6} \div \dfrac{7}{1} = \dfrac{35}{6} \times \dfrac{1}{7} = \dfrac{5}{6}$

58. $\dfrac{10}{2\frac{1}{2}} = 10 \div 2\dfrac{1}{2} = \dfrac{10}{1} \div \dfrac{5}{2} = \dfrac{10}{1} \times \dfrac{2}{5} = \dfrac{20}{5} = 4$

60. $\dfrac{5\frac{2}{3}}{0}$ is undefined.

62. $\dfrac{4\frac{1}{2}}{\frac{8}{9}} = 4\dfrac{1}{2} \div \dfrac{8}{9} = \dfrac{9}{2} \div \dfrac{8}{9} = \dfrac{9}{2} \times \dfrac{9}{8} = \dfrac{81}{16}$ or $5\dfrac{1}{16}$

64. $4\dfrac{2}{3} \times 5\dfrac{1}{7} = \dfrac{14}{3} \times \dfrac{36}{7} = \dfrac{2 \times 7 \times 3 \times 12}{3 \times 7} = 2 \times 12 = 24$

66.
$$\begin{aligned} x \div \frac{2}{5} &= \frac{15}{16} \\ x \cdot \frac{5}{2} &= \frac{15}{16} \\ \frac{3}{8} \cdot \frac{5}{2} &= \frac{15}{16} \\ x &= \frac{3}{8} \end{aligned}$$

68.
$$\begin{aligned} x \div \frac{11}{6} &= \frac{54}{121} \\ x \cdot \frac{6}{11} &= \frac{54}{121} \\ \frac{9}{11} \cdot \frac{6}{11} &= \frac{54}{121} \\ x &= \frac{9}{11} \end{aligned}$$

70. $7\dfrac{1}{2} \div 20 = \dfrac{15}{2} \div \dfrac{20}{1} = \dfrac{15}{2} \times \dfrac{1}{20} = \dfrac{5 \times 3}{2 \times 5 \times 4} = \dfrac{3}{8}$

Each segment of the beach is $\dfrac{3}{8}$ mile.

72.
$$\begin{aligned} 200 \div 4\frac{1}{6} &= \frac{200}{1} \div \frac{25}{6} \\ &= \frac{200}{1} \times \frac{6}{25} \\ &= 8 \times 6 \\ &= 48 \end{aligned}$$

His average speed was 48 miles per hour.

74. $113\dfrac{1}{3} \div 5\dfrac{2}{3} = \dfrac{340}{3} \div \dfrac{17}{3} = \dfrac{340}{3} \times \dfrac{3}{17} = 20$

20 transmitters are needed.

76. $390 \div \dfrac{3}{4} = \dfrac{390}{1} \times \dfrac{4}{3} = 520$

He must pack 520 boxes.

78. $28 \times \dfrac{3}{4} = \dfrac{28}{1} \times \dfrac{3}{4} = 21$

$48 \times \dfrac{7}{8} = \dfrac{48}{1} \times \dfrac{7}{8} = 42$

21 + 42 = 63

They hiked a total of 63 miles on these two trails.

80. Estimate by multiplying:
$18 \times 28 = 504$

$$\text{Exact} = 18\frac{1}{4} \times 27\frac{1}{2} = \frac{73}{4} \times \frac{55}{2} = \frac{4015}{8} = 501\frac{7}{8}$$

It is off by only $2\frac{1}{8}$.

Cumulative Review

81. 39,576,304 = thirty-nine million, five hundred seventy-six thousand, three hundred four

82. 509,270 = 500,000 + 9000 + 200 + 70

83. 126 + 34 + 9 + 891 + 12 + 27 = 1099

84. 87,595,631

Classroom Quiz 2.5

1. $\frac{16}{27} \div \frac{4}{13} = \frac{16}{27} \times \frac{13}{4} = \frac{4}{27} \times \frac{13}{1} = \frac{52}{27}$ or $1\frac{25}{27}$

2.
$$8\frac{1}{4} \div 3\frac{5}{6} = \frac{33}{4} \div \frac{23}{6}$$
$$= \frac{33}{4} \times \frac{6}{23}$$
$$= \frac{33}{2} \times \frac{3}{23}$$
$$= \frac{99}{46} \text{ or } 2\frac{7}{46}$$

3. $5\frac{1}{8} \div 3 = \frac{41}{8} \times \frac{1}{3} = \frac{41}{24}$ or $1\frac{17}{24}$

Use Math To Save Money

1. Tricia bought two cups of coffee each day.
$2 \times 3 \times 30 = 6 \times 30 = 180$
She spent \$180 on coffee each month.

2.
$$\begin{array}{r} 180 \\ \times\ 12 \\ \hline 360 \\ 180 \\ \hline 2160 \end{array}$$
She would spend \$2160 on coffee in 12 months.

3. $7 \times 180 = 1260$
In seven months, she would save \$1260, which is more than the TV would cost.

4.
$$\begin{array}{r} 1260 \\ -\ 1000 \\ \hline 260 \end{array}$$
There would be \$260 for the celebration dinner.

5. $\frac{3}{4} \times 1000 = \frac{3}{4} \times \frac{1000}{1} = \frac{3 \times 4 \times 250}{4 \times 1} = 750$

$$\begin{array}{r} 1260 \\ -\ 750 \\ \hline 510 \end{array}$$
There would be \$510 for the celebration dinner.

6. $2 \times 30 = 60$
Tricia drinks 60 cups of coffee each month.
$60 \div 20 = 3$
She will need 3 pounds of coffee each month.
$3 \times 10 = 30$
It would cost her \$30 each month to make her own coffee.

$$\begin{array}{r} 180 \\ -\ 30 \\ \hline 150 \end{array}$$
She would save \$150 each month by making coffee.

7.
$$\begin{array}{r} 150 \\ \times\ 12 \\ \hline 300 \\ 150 \\ \hline 1800 \end{array}$$
She would save \$1800 in a year by making coffee.

8. Answers will vary.

9. Answers will vary.

10. Answers will vary.

How Am I Doing? Sections 2.1–2.5
(Available online through MyMathLab or from the Instructor's Resource Center.)

1. Three out of eight equal parts are shaded. The fraction is $\frac{3}{8}$.

2. $\dfrac{\text{number from outside the country}}{\text{total number}}$
$= \dfrac{800}{3500+2600+800}$
$= \dfrac{800}{6900}$
$= \dfrac{8\times100}{69\times100}$
$= \dfrac{8}{69}$

3. $\dfrac{\text{number defective}}{\text{total number}} = \dfrac{10}{224} = \dfrac{2\times5}{2\times112} = \dfrac{5}{112}$

4. $\dfrac{4}{28} = \dfrac{4\div4}{28\div4} = \dfrac{1}{7}$

5. $\dfrac{13}{39} = \dfrac{13\div13}{39\div13} = \dfrac{1}{3}$

6. $\dfrac{16}{112} = \dfrac{16\div16}{112\div16} = \dfrac{1}{7}$

7. $\dfrac{175}{200} = \dfrac{175\div25}{200\div25} = \dfrac{7}{8}$

8. $\dfrac{44}{121} = \dfrac{44\div11}{121\div11} = \dfrac{4}{11}$

9. $3\dfrac{2}{3} = \dfrac{3\times3+2}{3} = \dfrac{11}{3}$

10. $15\dfrac{1}{3} = \dfrac{15\times3+1}{3} = \dfrac{46}{3}$

11. $4\overline{)81}$ 20, $\underline{8}$, 01, $\underline{0}$, 1

$\dfrac{81}{4} = 20\dfrac{1}{4}$

12. $5\overline{)29}$ 5, $\underline{25}$, 4

$\dfrac{29}{5} = 5\dfrac{4}{5}$

13. $17\overline{)36}$ 2, $\underline{34}$, 2

$\dfrac{36}{17} = 2\dfrac{2}{17}$

14. $\dfrac{5}{11}\times\dfrac{1}{4} = \dfrac{5\times1}{11\times4} = \dfrac{5}{44}$

15. $\dfrac{3}{7}\times\dfrac{14}{9} = \dfrac{3\times2\times7}{7\times3\times3} = \dfrac{2}{3}$

16. $3\dfrac{1}{3}\times5\dfrac{1}{3} = \dfrac{10}{3}\times\dfrac{16}{3} = \dfrac{160}{9}$ or $17\dfrac{7}{9}$

17. $\dfrac{3}{7}\div\dfrac{3}{7} = \dfrac{3}{7}\times\dfrac{7}{3} = 1$

18. $\dfrac{7}{16}\div\dfrac{7}{8} = \dfrac{7}{16}\times\dfrac{8}{7} = \dfrac{7\times8}{2\times8\times7} = \dfrac{1}{2}$

19. $6\dfrac{4}{7}\div1\dfrac{5}{21} = \dfrac{46}{7}\div\dfrac{26}{21}$
$= \dfrac{46}{7}\times\dfrac{21}{26}$
$= \dfrac{2\times23\times3\times7}{7\times2\times13}$
$= \dfrac{69}{13}$ or $5\dfrac{4}{13}$

20. $12\div\dfrac{4}{7} = \dfrac{12}{1}\times\dfrac{7}{4} = \dfrac{3}{1}\times\dfrac{7}{1} = 21$

2.6 Exercises

2. 6 and 9
Multiples of 6: 6, 12, 18, 24, 30, ...
Multiples of 9: 9, 18, 27, 36, 45, ...
The least common multiple is 18.

4. 22 and 55
Multiples of 22: 22, 44, 66, 88, 110, ...
Multiples of 55: 55, 110, 165, 220, 275, ...
The least common multiple is 110.

6. 18 and 30
Multiples of 18: 18, 36, 54, 72, 90, ...
Multiples of 30: 30, 60, 90, 120, 150, ...
The least common multiple is 90.

8. 8 and 60
Multiples of 8: 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120, ...
Multiples of 60: 60, 120, 180, 240, 300, ...
The least common multiple is 120.

10. 25 and 35
Multiples of 25: 25, 50, 75, 100, 125, 150, 175, 200, ...
Multiples of 35: 35, 70, 105, 140, 175, ...
The least common multiple is 175.

12. $7 = 7$
$14 = 2 \times 7$
$\text{LCD} = 2 \times 7 = 14$

14. $5 = 5$
$7 = 7$
$\text{LCD} = 5 \times 7 = 35$

16. $13 = 13$
$3 = 3$
$\text{LCD} = 13 \times 3 = 39$

18. $8 = 2 \times 2 \times 2$
$12 = 2 \times 2 \times 3$
$\text{LCD} = 2 \times 2 \times 2 \times 3 = 24$

20. $15 = 3 \times 5$
$25 = 5 \times 5$
$\text{LCD} = 3 \times 5 \times 5 = 75$

22. $11 = 11$
$44 = 2 \times 2 \times 11$
$\text{LCD} = 2 \times 2 \times 11 = 44$

24. $20 = 2 \times 2 = 5$
$30 = 2 \times 3 \times 5$
$\text{LCD} = 2 \times 2 \times 3 \times 5 = 60$

26. $6 = 2 \times 3$
$30 = 2 \times 3 \times 5$
$\text{LCD} = 2 \times 3 \times 5 = 30$

28. $20 = 2 \times 2 \times 5$
$70 = 2 \times 5 \times 7$
$\text{LCD} = 2 \times 2 \times 5 \times 7 = 140$

30. $30 = 2 \times 3 \times 5$
$50 = 2 \times 5 \times 5$
$\text{LCD} = 2 \times 3 \times 5 \times 5 = 150$

32. $5 = 5$
$3 = 3$
$10 = 2 \times 5$
$\text{LCD} = 2 \times 3 \times 5 = 30$

34. $48 = 2 \times 2 \times 2 \times 2 \times 3$
$12 = 2 \times 2 \times 3$
$8 = 2 \times 2 \times 2$
$\text{LCD} = 2 \times 2 \times 2 \times 2 \times 3 = 48$

36. $16 = 2 \times 2 \times 2 \times 2$
$20 = 2 \times 2 \times 5$
$5 = 5$
$\text{LCD} = 2 \times 2 \times 2 \times 2 \times 5 = 80$

38. $45 = 3 \times 3 \times 5$
$15 = 3 \times 5$
$30 = 2 \times 3 \times 5$
$\text{LCD} = 2 \times 3 \times 3 \times 5 = 90$

40. $36 = 2 \times 2 \times 3 \times 3$
$48 = 2 \times 2 \times 2 \times 2 \times 3$
$24 = 2 \times 2 \times 2 \times 3$
$\text{LCD} = 2 \times 2 \times 2 \times 2 \times 3 \times 3 = 144$

42. $\frac{1}{6} = \frac{1}{6} \times \frac{5}{5} = \frac{5}{30}$
The numerator is 5.

44. $\frac{7}{9} = \frac{7}{9} \times \frac{9}{9} = \frac{63}{81}$
The numerator is 63.

46. $\frac{5}{14} = \frac{5}{14} \times \frac{3}{3} = \frac{15}{42}$
The numerator is 15.

48. $\frac{3}{50} = \frac{3}{50} \times \frac{2}{2} = \frac{6}{100}$
The numerator is 6.

50. $\frac{6}{7} = \frac{6}{7} \times \frac{21}{21} = \frac{126}{147}$
The numerator is 126.

52. $\frac{3}{25}=\frac{3}{25}\times\frac{7}{7}=\frac{21}{175}$
The numerator is 21.

54. $\frac{9}{10}=\frac{9\times2}{10\times2}=\frac{18}{20}$
$\frac{3}{4}=\frac{3\times5}{4\times5}=\frac{15}{20}$

56. $\frac{5}{24}=\frac{5\times3}{24\times3}=\frac{15}{72}$
$\frac{7}{36}=\frac{7\times2}{36\times2}=\frac{14}{72}$

58. $\frac{19}{25}=\frac{19\times6}{25\times6}=\frac{114}{150}$
$\frac{7}{30}=\frac{7\times5}{30\times5}=\frac{35}{150}$

60. $9=3\times3$
$54=3\times3\times3\times2$
$\text{LCD}=2\times3\times3\times3=54$
$\frac{7}{9}=\frac{7\times6}{9\times6}=\frac{42}{54}$
$\frac{42}{54}$ and $\frac{35}{54}$

62. LCD = 42
$\frac{6}{7}=\frac{6\times6}{7\times6}=\frac{36}{42}$
$\frac{19}{42}$ and $\frac{36}{42}$

64. $20=2\times2\times5$
$8=2\times2\times2$
$\text{LCD}=2\times2\times2\times5=40$
$\frac{19}{20}=\frac{19\times2}{20\times2}=\frac{38}{40}$
$\frac{7}{8}=\frac{7\times5}{8\times5}=\frac{35}{40}$
$\frac{38}{40}$ and $\frac{35}{40}$

66. $10=2\times5$
$25=5\times5$
$\text{LCD}=2\times5\times5=50$
$\frac{9}{10}=\frac{9\times5}{10\times5}=\frac{45}{50}$
$\frac{3}{25}=\frac{3\times2}{25\times2}=\frac{6}{50}$
$\frac{45}{50}$ and $\frac{6}{50}$

68. $20=2\times2\times2\times5$
$15=3\times5$
$40=2\times2\times2\times5$
$\text{LCD}=2\times2\times2\times3\times5=120$
$\frac{3}{20}=\frac{3\times6}{20\times6}=\frac{18}{120}$
$\frac{7}{15}=\frac{7\times8}{15\times8}=\frac{56}{120}$
$\frac{9}{40}=\frac{9\times3}{40\times3}=\frac{27}{120}$
$\frac{18}{120}, \frac{56}{120}, \frac{27}{120}$

70. $7=7$
$9=3\times3$
$63=3\times3\times7$
$\text{LCD}=3\times3\times7=63$
$\frac{5}{7}=\frac{5\times9}{7\times9}=\frac{45}{63}$
$\frac{4}{9}=\frac{4\times7}{9\times7}=\frac{28}{63}$
$\frac{5}{63}=\frac{5}{63}$
$\frac{45}{63}, \frac{28}{63}, \frac{5}{63}$

72. $18=2\times3\times3$
$6=2\times3$
$36=2\times2\times3\times3$
$\text{LCD}=2\times2\times3\times3=36$
$\frac{7}{18}=\frac{7\times2}{18\times2}=\frac{14}{36}$
$\frac{5}{6}=\frac{5\times6}{6\times6}=\frac{30}{36}$
$\frac{13}{36}=\frac{13}{36}$
$\frac{14}{36}, \frac{30}{36}, \frac{13}{36}$

74. a. $32=2\times2\times2\times2\times2$
$6=2\times3$
$8=2\times2\times2$
$\text{LCD}=2\times2\times2\times2\times2\times3=96$

b. $\frac{5}{32}=\frac{5\times3}{32\times3}=\frac{15}{96}$

$\frac{5}{6}=\frac{5\times16}{6\times16}=\frac{80}{96}$

$\frac{7}{8}=\frac{7\times12}{8\times12}=\frac{84}{96}$

$\frac{15}{96},\frac{80}{96},\frac{84}{96}$

Cumulative Review

75. $(5-3)^2+4\times6-3=2^2+4\times6-3$
$=4+4\times6-3$
$=4+24-3$
$=28-3$
$=25$

76. $4\frac{3}{4}\times\frac{2}{3}=\frac{19}{4}\times\frac{2}{3}=\frac{19\times2}{2\times2\times3}=\frac{19}{6}$ or $3\frac{1}{6}$

77. $16\frac{1}{2}\div\frac{3}{4}=\frac{33}{2}\div\frac{3}{4}=\frac{33}{2}\times\frac{4}{3}=\frac{3\times11\times2\times2}{2\times3}=22$

Classroom Quiz 2.6

1. $14=2\times7$
$35=5\times7$
LCD $=2\times5\times7=70$

2. $5=5$
$8=2\times2\times2$
$10=2\times5$
LCD $=2\times2\times2\times5=40$

3. $\frac{11}{18}\times\frac{4}{4}=\frac{44}{72}$

2.7 Exercises

2. $\frac{7}{11}+\frac{3}{11}=\frac{7+3}{11}=\frac{10}{11}$

4. $\frac{12}{17}+\frac{4}{17}=\frac{12+4}{17}=\frac{16}{17}$

6. $\frac{19}{45}-\frac{4}{45}=\frac{19-4}{45}=\frac{15}{45}=\frac{1}{3}$

8. $\frac{103}{110}-\frac{3}{110}=\frac{103-3}{110}=\frac{100}{110}=\frac{10}{11}$

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

12. $\frac{3}{4}+\frac{2}{5}=\frac{15}{20}+\frac{8}{20}=\frac{15+8}{20}=\frac{23}{20}$ or $1\frac{3}{20}$

14. $\frac{11}{18}+\frac{1}{9}=\frac{11}{18}+\frac{2}{18}=\frac{11+2}{18}=\frac{13}{18}$

16. $\frac{2}{3}+\frac{4}{7}=\frac{14}{21}+\frac{12}{21}=\frac{26}{21}$ or $1\frac{5}{21}$

18. $\frac{13}{100}+\frac{7}{10}=\frac{13}{100}+\frac{70}{100}=\frac{13+70}{100}=\frac{83}{100}$

20. $\frac{8}{15}+\frac{3}{10}=\frac{16}{30}+\frac{9}{30}=\frac{16+9}{30}=\frac{25}{30}=\frac{5}{6}$

22. $\frac{5}{6}+\frac{7}{8}=\frac{20}{24}+\frac{21}{24}=\frac{20+21}{24}=\frac{41}{24}$ or $1\frac{17}{24}$

24. $\frac{12}{35}+\frac{1}{10}=\frac{24}{70}+\frac{7}{70}=\frac{24+7}{70}=\frac{31}{70}$

26. $\frac{37}{20}-\frac{2}{5}=\frac{37}{20}-\frac{8}{20}=\frac{37-8}{20}=\frac{29}{20}$ or $1\frac{9}{20}$

28. $\frac{8}{9}-\frac{3}{8}=\frac{64}{72}-\frac{27}{72}=\frac{64-27}{72}=\frac{37}{72}$

30. $\frac{9}{10}-\frac{1}{15}=\frac{27}{30}-\frac{2}{30}=\frac{25}{30}=\frac{5}{6}$

32. $\frac{9}{24}-\frac{3}{8}=\frac{9}{24}-\frac{9}{24}=0$

34. $\frac{7}{10}-\frac{2}{5}=\frac{7}{10}-\frac{4}{10}=\frac{7-4}{10}=\frac{3}{10}$

36. $\frac{20}{25}-\frac{4}{5}=\frac{20}{25}-\frac{20}{25}=0$

38. $\frac{7}{8}-\frac{1}{12}=\frac{21}{24}-\frac{2}{24}=\frac{21-2}{24}=\frac{19}{24}$

40. $\frac{2}{3}-\frac{12}{18}=\frac{12}{18}-\frac{12}{18}=\frac{12-12}{18}=\frac{0}{18}=0$

42. $\frac{2}{3}-\frac{1}{16}=\frac{32}{48}-\frac{3}{48}=\frac{32-3}{48}=\frac{29}{48}$

44. $\frac{7}{8}+\frac{5}{6}+\frac{7}{24}=\frac{21}{24}+\frac{20}{24}+\frac{7}{24}$
$=\frac{21+20+7}{24}$
$=\frac{48}{24}$
$=2$

46. $\frac{1}{12}+\frac{3}{14}+\frac{4}{21}=\frac{7}{84}+\frac{18}{84}+\frac{16}{84}=\frac{7+18+16}{84}=\frac{41}{84}$

48. $\frac{1}{12}+\frac{5}{36}+\frac{5}{6}=\frac{3}{36}+\frac{5}{36}+\frac{30}{36}$
$=\frac{3+5+30}{36}$
$=\frac{38}{36}$
$=\frac{19}{18}$ or $1\frac{1}{18}$

50. $x+\frac{1}{8}=\frac{7}{16}$
$x+\frac{2}{16}=\frac{7}{16}$
$\frac{5}{16}+\frac{2}{16}=\frac{7}{16}$
$x=\frac{5}{16}$

52. $x+\frac{4}{5}=\frac{33}{40}$
$x+\frac{32}{40}=\frac{33}{40}$
$\frac{1}{40}+\frac{32}{40}=\frac{33}{40}$
$x=\frac{1}{40}$

54. $x-\frac{7}{12}=\frac{5}{24}$
$x-\frac{14}{24}=\frac{5}{24}$
$\frac{19}{24}-\frac{14}{24}=\frac{5}{24}$
$x=\frac{19}{24}$

56. $\frac{3}{4}+\frac{3}{8}=\frac{6}{8}+\frac{3}{8}=\frac{9}{8}$ or $1\frac{1}{8}$

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

They ran a total of $1\frac{1}{8}$ miles and they walked a total of 1 mile.

58. $\frac{11}{32}-\frac{1}{8}=\frac{11}{32}-\frac{4}{32}=\frac{7}{32}$

The tread depth will decrease $\frac{7}{32}$ of an inch.

60. a. $\frac{1}{2}+\frac{1}{3}=\frac{3}{6}+\frac{2}{6}=\frac{5}{6}$

$\frac{5}{6}$ of the 5-gallon jug is full.

b. $\frac{1}{2}\times\frac{5}{6}=\frac{1\times5}{2\times6}=\frac{5}{12}$

There is $\frac{5}{12}$ of the 5-gallon jug left.

62. $\frac{1}{8}+\frac{1}{2}=\frac{1}{8}+\frac{4}{8}=\frac{5}{8}$

He needs $\frac{5}{8}$ cup for the two recipes.

$\frac{3}{4}-\frac{5}{8}=\frac{6}{8}-\frac{5}{8}=\frac{1}{8}$

He will have $\frac{1}{8}$ cup left.

Cumulative Review

64. $\frac{15}{85}=\frac{15\div5}{85\div5}=\frac{3}{17}$

65. $\frac{27}{207}=\frac{27\div9}{207\div9}=\frac{3}{23}$

66. $14\overline{)125}$ R 13, 8 $\qquad$ $\frac{125}{14}=8\frac{13}{14}$

67. $14\frac{3}{7}=\frac{14\times7+3}{7}=\frac{101}{7}$

68. $4\frac{1}{3} \div 1\frac{1}{2} = \frac{13}{3} \div \frac{3}{2} = \frac{13}{3} \times \frac{2}{3} = \frac{26}{9}$ or $2\frac{8}{9}$

69. $5\frac{1}{2} \times 1\frac{3}{11} = \frac{11}{2} \times \frac{14}{11} = \frac{1}{1} \times \frac{7}{1} = 7$

Classroom Quiz 2.7

1. $\frac{7}{8} + \frac{7}{10} = \frac{7}{8} \times \frac{5}{5} + \frac{7}{10} \times \frac{4}{4} = \frac{35}{40} + \frac{28}{40} = \frac{63}{40}$ or $1\frac{23}{40}$

2. $\frac{5}{24} + \frac{5}{6} + \frac{3}{8} = \frac{5}{24} + \frac{5}{6} \times \frac{4}{4} + \frac{3}{8} \times \frac{3}{3}$

$= \frac{5}{24} + \frac{20}{24} + \frac{9}{24}$

$= \frac{34}{24}$

$= \frac{17}{12}$ or $1\frac{5}{12}$

3. $\frac{2}{3} - \frac{5}{16} = \frac{2}{3} \times \frac{16}{16} - \frac{5}{16} \times \frac{3}{3} = \frac{32}{48} - \frac{15}{48} = \frac{17}{48}$

2.8 Exercises

2.
$$\begin{array}{r} 8\frac{3}{8} \\ +\ 5\frac{3}{8} \\ \hline 13\frac{6}{8} = 13\frac{3}{4} \end{array}$$

4.
$$\begin{array}{r} 9\frac{5}{10} \\ -\ 2\frac{3}{10} \\ \hline 7\frac{2}{10} = 7\frac{1}{5} \end{array}$$

6.
$$\begin{array}{r} 5\frac{3}{14} \\ +\ 3\frac{5}{14} \\ \hline 8\frac{8}{14} = 8\frac{4}{7} \end{array}$$

8.
$$\begin{array}{r} 8\frac{2}{9} \\ +\ 7\frac{7}{9} \\ \hline 15\frac{9}{9} = 16 \end{array}$$

10.
$$\begin{array}{r} 1 \\ -\ \frac{9}{11} \\ \hline \end{array} \qquad \begin{array}{r} \frac{11}{11} \\ -\ \frac{9}{11} \\ \hline \frac{2}{11} \end{array}$$

12.
$$\begin{array}{r} 1\frac{2}{3} \\ +\ \frac{13}{18} \\ \hline \end{array} \qquad \begin{array}{r} 1\frac{12}{18} \\ +\ \frac{13}{18} \\ \hline 1\frac{25}{18} = 2\frac{7}{18} \end{array}$$

14.
$$\begin{array}{r} 6\frac{2}{5} \\ +\ 7\frac{3}{20} \\ \hline \end{array} \qquad \begin{array}{r} 6\frac{8}{20} \\ +\ 7\frac{3}{20} \\ \hline 13\frac{11}{20} \end{array}$$

16.
$$\begin{array}{r} 9\frac{3}{4} \\ -\ 5\frac{1}{6} \\ \hline \end{array} \qquad \begin{array}{r} 9\frac{9}{12} \\ -\ 5\frac{2}{12} \\ \hline 4\frac{7}{12} \end{array}$$

18.
$$\begin{array}{r} 10\frac{10}{15} \\ -\ 10\frac{2}{3} \\ \hline \end{array} \qquad \begin{array}{r} 10\frac{10}{15} \\ -\ 10\frac{10}{15} \\ \hline 0 \end{array}$$

20.
$$\begin{array}{r} 25 \\ -\ 14\frac{2}{11} \\ \hline \end{array} \qquad \begin{array}{r} 24\frac{11}{11} \\ -\ 14\frac{2}{11} \\ \hline 10\frac{9}{11} \end{array}$$

22.
$$\begin{array}{r} 8 \\ +\ 2\frac{3}{4} \\ \hline 10\frac{3}{4} \end{array}$$

24.
$$\begin{array}{r} 18 \\ -\ 4\frac{3}{5} \\ \hline \end{array}$$

$$\begin{array}{r} 17\frac{5}{5} \\ -\ 4\frac{3}{5} \\ \hline 13\frac{2}{5} \end{array}$$

26.
$$\begin{array}{r} 22\frac{1}{8} \\ +\ 14\frac{3}{8} \\ \hline 36\frac{4}{8} = 36\frac{1}{2} \end{array}$$

28.
$$\begin{array}{r} 8\frac{1}{5} \\ +\ 7\frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 8\frac{4}{20} \\ +\ 7\frac{5}{20} \\ \hline 15\frac{9}{20} \end{array}$$

30.
$$\begin{array}{r} 10\frac{5}{6} \\ +\ 9\frac{2}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 10\frac{5}{6} \\ +\ 9\frac{4}{6} \\ \hline 19\frac{9}{6} = 20\frac{3}{6} = 20\frac{1}{2} \end{array}$$

32.
$$\begin{array}{r} 34\frac{1}{20} \\ +\ 45\frac{8}{15} \\ \hline \end{array}$$

$$\begin{array}{r} 34\frac{3}{60} \\ +\ 45\frac{32}{60} \\ \hline 79\frac{35}{60} = 79\frac{7}{12} \end{array}$$

34.
$$\begin{array}{r} 22\frac{7}{9} \\ -\ 16\frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 22\frac{28}{36} \\ -\ 16\frac{9}{36} \\ \hline 6\frac{19}{36} \end{array}$$

36.
$$\begin{array}{r} 4\frac{1}{12} \\ -\ 3\frac{7}{18} \\ \hline \end{array}$$

$$\begin{array}{r} 4\frac{3}{36} \\ -\ 3\frac{14}{36} \\ \hline \end{array}$$

$$\begin{array}{r} 3\frac{39}{36} \\ -\ 3\frac{14}{36} \\ \hline \frac{25}{36} \end{array}$$

38.
$$\begin{array}{r} 8\frac{5}{12} \\ -\ 5\frac{9}{10} \\ \hline \end{array}$$

$$\begin{array}{r} 8\frac{25}{60} \\ -\ 5\frac{54}{60} \\ \hline \end{array}$$

$$\begin{array}{r} 7\frac{85}{60} \\ -\ 5\frac{54}{60} \\ \hline 2\frac{31}{60} \end{array}$$

40.
$$\begin{array}{r} 40 \\ -\ 6\frac{3}{7} \\ \hline \end{array}$$

$$\begin{array}{r} 39\frac{7}{7} \\ -\ 6\frac{3}{7} \\ \hline 33\frac{4}{7} \end{array}$$

42.
$$\begin{array}{r} 87 \\ -\ 56\frac{7}{10} \\ \hline \end{array}$$

$$\begin{array}{r} 86\frac{10}{10} \\ -\ 56\frac{7}{10} \\ \hline 30\frac{3}{10} \end{array}$$

44.
$$\begin{array}{r} 4\frac{2}{3} \\ 3\frac{4}{5} \\ +\ 6\frac{3}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 4\frac{40}{60} \\ 3\frac{48}{60} \\ +\ 6\frac{45}{60} \\ \hline 13\frac{133}{60} = 15\frac{13}{60} \end{array}$$

46.
$$\begin{array}{r} \frac{9}{10} \\ 24\frac{4}{5} \\ +\ 6\frac{1}{5} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{9}{10} \\ 24\frac{8}{10} \\ +\ 6\frac{2}{10} \\ \hline 30\frac{19}{10} = 31\frac{9}{10} \end{array}$$

The triathlon consists of $31\frac{9}{10}$ miles.

48. $69\frac{15}{16}$
$-\ 57\frac{13}{16}$
$12\frac{2}{16} = 12\frac{1}{8}$

The muskellunge was $12\frac{1}{8}$ pounds heavier.

50. $3\frac{3}{4}$ $\qquad$ $3\frac{9}{12}$
$-\ 1\frac{2}{3}$ $\qquad$ $-\ 1\frac{8}{12}$
$\qquad\qquad 2\frac{1}{12}$

Julio bought $2\frac{1}{12}$ pounds more turkey than salami.

52. a. $17\frac{5}{8}$ $\qquad$ $17\frac{5}{8}$
$+\ 13\frac{1}{2}$ $\qquad$ $+\ 13\frac{4}{8}$
$\qquad\qquad 30\frac{9}{8} = 31\frac{1}{8}$

He lost a total of $31\frac{1}{8}$ pounds.

b. 46 $\qquad$ $45\frac{8}{8}$
$-\ 31\frac{1}{8}$ $\qquad$ $-\ 31\frac{1}{8}$
$\qquad\qquad 14\frac{7}{8}$

He needs to lose another $14\frac{7}{8}$ pounds.

54. $\frac{151}{6} - \frac{130}{7} = \frac{1057}{42} - \frac{780}{42}$
$= \frac{1057 - 780}{42}$
$= \frac{277}{42}$ or $6\frac{25}{42}$

56. Estimate: $103 - 87 = 16$

Exact: $102\frac{5}{7}$ $\qquad$ $102\frac{15}{21}$
$-\ 86\frac{2}{3}$ $\qquad$ $-\ 86\frac{14}{21}$
$\qquad\qquad 16\frac{1}{21}$

Our estimate is very close. We are off by only $\frac{1}{21}$.

58. $\frac{3}{5} - \frac{1}{3} \times \frac{6}{5} = \frac{3}{5} - \frac{2}{5} = \frac{1}{5}$

60. $\frac{3}{4} + \frac{1}{4} \div \frac{5}{3} = \frac{3}{4} + \frac{1}{4} \times \frac{3}{5}$
$= \frac{3}{4} + \frac{3}{20}$
$= \frac{3}{4} \times \frac{5}{5} + \frac{3}{20}$
$= \frac{15}{20} + \frac{3}{20}$
$= \frac{18}{20}$
$= \frac{9}{10}$

62. $\frac{5}{12} \div \frac{3}{10} \times \frac{9}{5} = \frac{5}{12} \times \frac{10}{3} \times \frac{9}{5} = \frac{1}{2} \times \frac{5}{1} \times \frac{1}{1} = \frac{5}{2}$ or $2\frac{1}{2}$

64. $\frac{5}{6} \times \frac{1}{2} + \frac{2}{3} \div \frac{4}{3} = \frac{5}{6} \times \frac{1}{2} + \frac{2}{3} \times \frac{3}{4}$
$= \frac{5}{12} + \frac{1}{2}$
$= \frac{5}{12} + \frac{1}{2} \times \frac{6}{6}$
$= \frac{5}{12} + \frac{6}{12}$
$= \frac{11}{12}$

66. $\left(\frac{1}{3}+\frac{1}{6}\right)\times\frac{5}{11}=\left(\frac{1}{3}\times\frac{2}{2}+\frac{1}{6}\right)\times\frac{5}{11}$
$=\left(\frac{2}{6}+\frac{1}{6}\right)\times\frac{5}{11}$
$=\frac{3}{6}\times\frac{5}{11}$
$=\frac{1}{2}\times\frac{5}{11}$
$=\frac{5}{22}$

68. $\left(\frac{3}{4}\right)^2\div\frac{5}{4}=\frac{9}{16}\div\frac{5}{4}=\frac{9}{16}\times\frac{4}{5}=\frac{9}{20}$

70. $\frac{5}{7}\times\left(\frac{4}{5}\right)^2=\frac{5}{7}\times\frac{16}{25}=\frac{1}{7}\times\frac{16}{5}=\frac{16}{35}$

72. $\frac{7}{9}\div\left(\frac{5}{6}-\frac{1}{2}\right)^2=\frac{7}{9}\div\left(\frac{5}{6}-\frac{3}{6}\right)^2$
$=\frac{7}{9}\div\left(\frac{2}{6}\right)^2$
$=\frac{7}{9}\div\left(\frac{1}{3}\right)^2$
$=\frac{7}{9}\div\frac{1}{9}$
$=\frac{7}{9}\times\frac{9}{1}$
$=7$

Cumulative Review

73.
$$\begin{array}{r} 1200 \\ \times\quad 400 \\ \hline 480,000 \end{array}$$

74.
$$\begin{array}{r} 4050 \\ \times\quad 2106 \\ \hline 24\ 300 \\ 405\ 00 \\ 8\ 100 \\ \hline 8,529,300 \end{array}$$

Classroom Quiz 2.8

1.
$$\begin{array}{r} 7\frac{5}{12} \\ +\ 4\frac{11}{18} \\ \hline \end{array} \qquad \begin{array}{r} 7\frac{15}{36} \\ +\ 4\frac{22}{36} \\ \hline 11\frac{37}{36}=12\frac{1}{36} \end{array}$$

2.
$$\begin{array}{r} 13\frac{2}{9} \\ -\ 7\frac{3}{4} \\ \hline \end{array} \qquad \begin{array}{r} 13\frac{8}{36} \\ -\ 7\frac{27}{36} \\ \hline \end{array} \qquad \begin{array}{r} 12\frac{44}{36} \\ -\ 7\frac{27}{36} \\ \hline 5\frac{17}{36} \end{array}$$

3. $\frac{3}{7}+\frac{5}{8}\div\frac{21}{16}=\frac{3}{7}+\frac{5}{8}\times\frac{16}{21}=\frac{3}{7}+\frac{10}{21}=\frac{9}{21}+\frac{10}{21}=\frac{19}{21}$

2.9 Exercises

2.
$$\begin{array}{r} 10\frac{1}{3} \\ 12\frac{3}{4} \\ +\ 14\frac{1}{2} \\ \hline \end{array} \qquad \begin{array}{r} 10\frac{4}{12} \\ 12\frac{9}{12} \\ +\ 14\frac{6}{12} \\ \hline 36\frac{19}{12}=37\frac{7}{12} \end{array}$$

She ran a total of $37\frac{7}{12}$ miles.

4. $\frac{5}{8}\times 7696=\frac{5}{8}\times\frac{7696}{1}$
$=\frac{5\times 8\times 962}{8\times 1}$
$=5\times 962$
$=4810$

4810 customers are coming in response to advertising on television or in the newspapers.

6. $4\frac{7}{8}+1\frac{2}{3}=4\frac{21}{24}+1\frac{16}{24}=5\frac{37}{24}=6\frac{13}{24}$

Then $8-6\frac{13}{24}=7\frac{24}{24}-6\frac{13}{24}=1\frac{11}{24}$

The notch needs to be $1\frac{11}{24}$ feet.

8. $115\frac{1}{2} \div 8\frac{1}{4} = \frac{231}{2} \div \frac{33}{4}$

$= \frac{231}{2} \times \frac{4}{33}$

$= \frac{33 \times 7}{2} \times \frac{2 \times 2}{33}$

$= 14$

He will be able to insulate 14 windows.

10. $1\frac{3}{4} \times 3 = \frac{7}{4} \times \frac{3}{1} = \frac{21}{4} = 5\frac{1}{4}$

She will use $5\frac{1}{4}$ cups of flour.

$5\frac{1}{4} \times 4\frac{1}{2} = \frac{21}{4} \times \frac{9}{2} = \frac{189}{8} = 23\frac{5}{8}$

She will use $23\frac{5}{8}$ ounces of flour.

12. $7\frac{1}{4} \times 62\frac{1}{2} = \frac{29}{4} \times \frac{125}{2} = \frac{3625}{8} = 453\frac{1}{8}$

The water weighs $453\frac{1}{8}$ pounds.

14.
$$\begin{array}{r} 1200 \times \frac{1}{10} = 120 \\ 1200 \times \frac{1}{3} = 400 \\ +\ 1200 \times \frac{1}{6} = 200 \\ \hline 720 \end{array} \qquad \begin{array}{r} 1200 \\ -\ 720 \\ \hline 480 \end{array}$$

He had \$480 left.

16. $\frac{1}{4} \times 960 = 240$

$\frac{1}{10} \times 960 = 96$

$\frac{1}{3} \times 960 = 320$

$240 + 96 + 320 = 656$

$960 - 656 = 304$

\$304 is left per week.

18. a. $6 \times 12\frac{1}{2} \times 14\frac{2}{3} = \frac{6}{1} \times \frac{25}{2} \times \frac{44}{3}$

$= 25 \times 44$

$= 1100$

The carpet will cost \$1100.

b. $2 \times 12\frac{1}{2} + 2 \times 14\frac{2}{3} = \frac{2}{1} \times \frac{25}{2} + \frac{2}{1} \times \frac{44}{3}$

$= 25 + \frac{88}{3}$

$= 25 + 29\frac{1}{3}$

$= 54\frac{1}{3}$

They will need 55 feet of molding.

20. $2 \times 1\frac{1}{4} = \frac{2}{1} \times \frac{5}{4} = \frac{5}{2} = 2\frac{1}{2}$

$3 \times 2\frac{3}{8} = \frac{3}{1} \times \frac{19}{8} = \frac{57}{8} = 7\frac{1}{8}$

$$\begin{array}{r} 2\frac{1}{2} \\ +\ 7\frac{1}{8} \\ \hline \end{array} \qquad \begin{array}{r} 2\frac{4}{8} \\ +\ 7\frac{1}{8} \\ \hline 9\frac{5}{8} \end{array}$$

$$\begin{array}{r} 14\frac{1}{4} \\ -\ 9\frac{5}{8} \\ \hline \end{array} \qquad \begin{array}{r} 14\frac{2}{8} \\ -\ 9\frac{5}{8} \\ \hline \end{array} \qquad \begin{array}{r} 13\frac{10}{8} \\ -\ 9\frac{5}{8} \\ \hline 4\frac{5}{8} \end{array}$$

Jane will have $4\frac{5}{8}$ cups of flour left.

22. a. $32\frac{5}{8} \div 2\frac{1}{4} = \frac{261}{8} \div \frac{9}{4} = \frac{261}{8} \times \frac{4}{9} = \frac{29}{2}$ or $14\frac{1}{2}$

The boat is traveling at $14\frac{1}{2}$ knots.

b. $21\frac{3}{4} \div 14\frac{1}{2} = \frac{87}{4} \div \frac{29}{2} = \frac{87}{4} \times \frac{2}{29} = \frac{3}{2}$ or $1\frac{1}{2}$

It will take the them $1\frac{1}{2}$ hours.

24. a. $8693\frac{1}{3} \div 1\frac{1}{3} = \frac{26,080}{3} \div \frac{4}{3}$

$= \frac{26,080}{3} \times \frac{3}{4}$

$= 6520$

It holds 6520 barrels.

b. $8693\frac{1}{3}\times 1\frac{1}{3}=\frac{26,080}{3}\times\frac{4}{3}$

$=\frac{104,320}{9}$

$=11,591\frac{1}{9}$

The new bin will hold $11,591\frac{1}{9}$ cubic feet.

c. $\frac{104,320}{9}\div\frac{4}{3}=\frac{104,320}{9}\times\frac{3}{4}$

$=\frac{26,080}{3}$

$=8693\frac{1}{3}$

It will hold $8693\frac{1}{3}$ barrels.

Cumulative Review

25. $\frac{17}{36}-\frac{2}{9}=\frac{17}{36}-\frac{8}{36}=\frac{17-8}{36}=\frac{9}{36}=\frac{1}{4}$

26. $\frac{1}{5}+\frac{2}{5}\times\frac{3}{2}-\frac{1}{10}=\frac{1}{5}+\frac{2\times 3}{5\times 2}-\frac{1}{10}$

$=\frac{1}{5}+\frac{3}{5}-\frac{1}{10}$

$=\frac{2}{10}+\frac{6}{10}-\frac{1}{10}$

$=\frac{2+6-1}{10}$

$=\frac{7}{10}$

27. $30\times 4\frac{2}{3}=\frac{30}{1}\times\frac{14}{3}=\frac{3\times 10\times 14}{1\times 3}=140$

28. $\frac{15}{16}\div 1\frac{1}{4}=\frac{15}{16}\div\frac{5}{4}=\frac{15}{16}\times\frac{4}{5}=\frac{3\times 5\times 4}{4\times 4\times 5}=\frac{3}{4}$

Classroom Quiz 2.9

1. $4\frac{3}{4}\times 2\frac{1}{3}=\frac{19}{4}\times\frac{7}{3}=\frac{133}{12}$ or $11\frac{1}{12}$

She ran $11\frac{1}{12}$ miles.

2. $\frac{75\frac{3}{8}}{2\frac{1}{4}}=\frac{603}{8}\div\frac{9}{4}$

$=\frac{603}{8}\times\frac{4}{9}$

$=\frac{67}{2}$ or $33\frac{1}{2}$

It can travel $33\frac{1}{2}$ miles per hour.

3.

$$\begin{array}{r} 3\frac{1}{5} \\ 2\frac{1}{2} \\ +\,1\frac{3}{4} \\ \hline \end{array} \qquad \begin{array}{r} 3\frac{4}{20} \\ 2\frac{10}{20} \\ +\,1\frac{15}{20} \\ \hline 6\frac{29}{20}=7\frac{9}{20} \end{array}$$

$7\frac{9}{20}$ miles of fence is required to enclose the field.

Career Exploration Problems

1. a. $3\times 5\frac{3}{4}=3\times\frac{23}{4}=\frac{69}{4}=17\frac{1}{4}$

Dawn should order $17\frac{1}{4}$ pounds of green beans.

b. $2\times\left(6\frac{3}{4}+8\frac{1}{2}\right)=2\times\left(15\frac{1}{4}\right)=30\frac{1}{2}$

Dawn should order $30\frac{1}{2}$ pounds of potatoes.

c. Beef chuck roast: $2\times 12\frac{1}{4}=24\frac{1}{2}$ pounds

Ground beef: $3\times 6\frac{3}{4}=20\frac{1}{4}$ pounds

Green beans: $3\times 5\frac{3}{4}=17\frac{1}{4}$ pounds

Potatoes: $2\times\left(6\frac{3}{4}+8\frac{1}{2}\right)=30\frac{1}{2}$ pounds

$$\text{Total} = 24\frac{1}{2} + 20\frac{1}{4} + 17\frac{1}{4} + 30\frac{1}{2}$$
$$= 92\frac{1}{2} \text{ pounds}$$

Dawn must order a total of $92\frac{1}{2}$ pounds of food.

d. 45 pounds + 45 pounds = 90 pounds
Yes, she will receive a discount of
\$5 + \$5 = \$10.

2. a. Feet for one room = number of baseboards × length in feet + number of baseboards × length in feet

$$= 2 \times 20 + 2 \times 12\frac{1}{8}$$
$$= 40 + 24\frac{1}{4}$$
$$= 64\frac{1}{4}$$

Each room requires $64\frac{1}{4}$ feet of baseboard.

b. Waste = length in feet × number of rooms

$$= 1\frac{1}{4} \times 20$$
$$= 25$$

Jason should include 25 feet of extra material.

c. Total feet = length for each room × number of rooms + extra material

$$= 64\frac{1}{4} \times 20 + 25$$
$$= 1285 + 25$$
$$= 1310$$

Jason will need a total of 1310 feet of baseboard.

d. Total Cost = cost per foot × number of feet

$$= 1\frac{1}{2} \times 1310$$
$$= 1965$$

It will cost a total of \$1965 to put baseboard in all 20 rooms.

You Try It

1. Nine of 14 equal parts are shaded, so $\frac{9}{14}$ is shaded.

2. $\frac{\text{games won}}{\text{total games}} = \frac{85}{115} = \frac{5 \times 17}{5 \times 23} = \frac{17}{23}$

The team won $\frac{17}{23}$ of the games.

3. $60 = 2\times2\times3\times5 = 2^2\times3\times5$

4. $\frac{24}{80} = \frac{2\times2\times2\times3}{2\times2\times2\times2\times5} = \frac{3}{2\times5} = \frac{3}{10}$

5. $10\frac{2}{3} = \frac{10\times3+2}{3} = \frac{30+2}{3} = \frac{32}{3}$

6.
$$3\overline{)28}\quad 9$$
$$\underline{27}$$
$$1$$

$\frac{28}{3} = 9\frac{1}{3}$

7. a. $\frac{2}{5}\times\frac{2}{9} = \frac{2\times2}{5\times9} = \frac{4}{45}$

b. $\frac{4}{5}\times\frac{25}{28} = \frac{4\times5\times5}{5\times4\times7} = \frac{5}{7}$

8. $2\frac{1}{2}\times4\frac{2}{5} = \frac{5}{2}\times\frac{22}{5} = \frac{5\times2\times11}{2\times5} = \frac{11}{1} = 11$

9. $\frac{1}{3}\div\frac{2}{5} = \frac{1}{3}\times\frac{5}{2} = \frac{1\times5}{3\times2} = \frac{5}{6}$

10.
$$7\frac{1}{5}\div2\frac{1}{10} = \frac{36}{5}\div\frac{21}{10}$$
$$= \frac{36}{5}\times\frac{10}{21}$$
$$= \frac{3\times12\times5\times2}{5\times3\times7}$$
$$= \frac{12\times2}{7}$$
$$= \frac{24}{7} \text{ or } 3\frac{3}{7}$$

11. $6 = 2\times3$
$10 = 2\times5$
$24 = 2\times2\times2\times3$
LCD $= 2\times2\times2\times3\times5 = 120$

12. $\frac{4}{9} = \frac{4\times6}{9\times6} = \frac{24}{54}$

13. a. $\frac{7}{15}+\frac{1}{15} = \frac{7+1}{15} = \frac{8}{15}$

b. $\frac{8}{11}-\frac{7}{11} = \frac{8-7}{11} = \frac{1}{11}$

14.
$$\frac{1}{3}+\frac{3}{5}+\frac{9}{10} = \frac{1}{3}\times\frac{10}{10}+\frac{3}{5}\times\frac{6}{6}+\frac{9}{10}\times\frac{3}{3}$$
$$= \frac{10}{30}+\frac{18}{30}+\frac{27}{30}$$
$$= \frac{10+18+27}{30}$$
$$= \frac{55}{30}$$
$$= \frac{5\times11}{5\times6}$$
$$= \frac{11}{6} \text{ or } 1\frac{5}{6}$$

15.
$$\begin{array}{r} 8\frac{5}{6} \\ +3\frac{1}{3} \\ \hline \end{array} \qquad \begin{array}{r} 8\frac{5}{6} \\ +3\frac{2}{6} \\ \hline 11\frac{7}{6} = 12\frac{1}{6} \end{array}$$

16.
$$\begin{array}{r} 10\frac{1}{4} \\ -3\frac{4}{5} \\ \hline \end{array} \qquad \begin{array}{r} 10\frac{5}{20} \\ -3\frac{16}{20} \\ \hline \end{array} \qquad \begin{array}{r} 9\frac{25}{20} \\ -3\frac{16}{20} \\ \hline 6\frac{9}{20} \end{array}$$

17.
$$6\times\frac{1}{2}+\left(\frac{9}{10}-\frac{2}{5}\right) = 6\times\frac{1}{2}+\left(\frac{9}{10}-\frac{4}{10}\right)$$
$$= 6\times\frac{1}{2}+\frac{5}{10}$$
$$= 6\times\frac{1}{2}+\frac{1}{2}$$
$$= \frac{6}{1}\times\frac{1}{2}+\frac{1}{2}$$
$$= \frac{2\times3\times1}{1\times2}+\frac{1}{2}$$
$$= 3+\frac{1}{2}$$
$$= \frac{6}{2}+\frac{1}{2}$$
$$= \frac{7}{2} \text{ or } 3\frac{1}{2}$$

Chapter 2 Review Problems

1. Three out of eight equal parts are shaded. The fraction is $\frac{3}{8}$.

2. Five out of twelve equal parts are shaded. The fraction is $\frac{5}{12}$.

3. Answers will vary.

4. Answers will vary.

5. $\frac{\text{number defective}}{\text{total number}} = \frac{9}{80}$

6. $\frac{\text{number who would not}}{\text{total number}} = \frac{87}{100}$

7. $54 = 2\times 27 = 2\times 3\times 9 = 2\times 3\times 3\times 3 = 2\times 3^3$

8. $120 = 10\times 12 = 2\times 5\times 2\times 2\times 3 = 2^3\times 3\times 5$

9. $168 = 8\times 21 = 2\times 2\times 2\times 3\times 7 = 2^3\times 3\times 7$

10. 59 is prime.

11. $78 = 2\times 39 = 2\times 3\times 13$

12. 167 is prime.

13. $\frac{12}{42} = \frac{12\div 6}{42\div 6} = \frac{2}{7}$

14. $\frac{13}{52} = \frac{13\div 13}{52\div 13} = \frac{1}{4}$

15. $\frac{27}{72} = \frac{27\div 9}{72\div 9} = \frac{3}{8}$

16. $\frac{168}{192} = \frac{168\div 24}{192\div 24} = \frac{7}{8}$

17. $4\frac{3}{8} = \frac{4\times 8+3}{8} = \frac{35}{8}$

18. $15\frac{3}{4} = \frac{15\times 4+3}{4} = \frac{63}{4}$

19. $6\frac{3}{5} = \frac{6\times 5+3}{5} = \frac{33}{5}$

20.
$$8\overline{)45}\quad 5$$
$$\underline{40}$$
$$5$$
$$\frac{45}{8} = 5\frac{5}{8}$$

21.
$$21\overline{)100}\quad 4$$
$$\underline{84}$$
$$16$$
$$\frac{100}{21} = 4\frac{16}{21}$$

22.
$$7\overline{)53}\quad 7$$
$$\underline{49}$$
$$4$$
$$\frac{53}{7} = 7\frac{4}{7}$$

23. $\frac{15}{55} = \frac{5\times 3}{5\times 11} = \frac{3}{11}$

$3\frac{15}{55} = 3\frac{3}{11}$

24. $\frac{234}{16} = \frac{117\times 2}{8\times 2} = \frac{117}{8}$

25.
$$32\overline{)132}\quad 4$$
$$\underline{128}$$
$$4$$
$$\frac{132}{32} = 4\frac{4}{32} = 4\frac{1}{8}$$

26. $\frac{4}{7}\times\frac{5}{11} = \frac{4\times 5}{7\times 11} = \frac{20}{77}$

27. $\frac{7}{9}\times\frac{21}{35} = \frac{1}{3}\times\frac{7}{5} = \frac{7}{15}$

28. $12\times\frac{3}{7}\times 0 = 0$

29. $\frac{3}{5}\times\frac{2}{7}\times\frac{10}{27}=\frac{1}{1}\times\frac{2}{7}\times\frac{2}{9}=\frac{4}{63}$

30. $5\frac{1}{8}\times3\frac{1}{5}=\frac{41}{8}\times\frac{16}{5}=\frac{41}{1}\times\frac{2}{5}=\frac{82}{5}$ or $16\frac{2}{5}$

31. $36\times\frac{4}{9}=\frac{36}{1}\times\frac{4}{9}=\frac{4}{1}\times\frac{4}{1}=16$

32. $37\frac{5}{8}\times18=\frac{301}{8}\times\frac{18}{1}=\frac{301}{4}\times\frac{9}{1}=\frac{2709}{4}=677\frac{1}{4}$

18 shares cost $\$677\frac{1}{4}$.

33. $13\frac{1}{2}\times9\frac{2}{3}=\frac{27}{2}\times\frac{29}{3}=\frac{9}{2}\times\frac{29}{1}=\frac{261}{2}$ or $130\frac{1}{2}$

The area is $\frac{261}{2}$ or $130\frac{1}{2}$ square feet.

34. $\frac{3}{7}\div\frac{2}{5}=\frac{3}{7}\times\frac{5}{2}=\frac{15}{14}$ or $1\frac{1}{14}$

35. $900\div\frac{3}{5}=\frac{900}{1}\times\frac{5}{3}=1500$

36. $5\frac{3}{4}\div11\frac{1}{2}=\frac{23}{4}\div\frac{23}{2}=\frac{23}{4}\times\frac{2}{23}=\frac{1}{2}$

37. $20\div2\frac{1}{2}=\frac{20}{1}\div\frac{5}{2}=\frac{20}{1}\times\frac{2}{5}=8$

38. $0\div3\frac{7}{5}=0$

39. $4\frac{2}{11}\div3=\frac{46}{11}\div\frac{3}{1}=\frac{46}{11}\times\frac{1}{3}=\frac{46}{33}$ or $1\frac{13}{33}$

40. $342\div28\frac{1}{2}=\frac{342}{1}\div\frac{57}{2}=\frac{342}{1}\times\frac{2}{57}=6\times2=12$

12 rolls are needed.

41.
$$\begin{aligned}420\div2\frac{1}{4}&=\frac{420}{1}\div\frac{9}{4}\\&=\frac{420}{1}\times\frac{4}{9}\\&=\frac{140}{1}\times\frac{4}{3}\\&=\frac{560}{3}\text{ or }186\frac{2}{3}\text{ calories}\end{aligned}$$

42. $14=2\times7$
$49=7\times7$
$\text{LCD}=2\times7\times7=98$

43. $20=2\times2\times5$
$25=5\times5$
$\text{LCD}=2\times2\times5\times5=100$

44. $18=2\times3\times3$
$6=2\times3$
$45=3\times3\times5$
$\text{LCD}=2\times3\times3\times5=90$

45. $\frac{3}{7}=\frac{3}{7}\times\frac{8}{8}=\frac{24}{56}$

46. $\frac{11}{24}=\frac{11}{24}\times\frac{3}{3}=\frac{33}{72}$

47. $\frac{8}{15}=\frac{8}{15}\times\frac{10}{10}=\frac{80}{150}$

48. $\frac{9}{14}-\frac{5}{14}=\frac{4}{14}=\frac{2}{7}$

49.
$$\begin{aligned}\frac{1}{2}+\frac{1}{3}+\frac{1}{4}&=\frac{1}{2}\times\frac{6}{6}+\frac{1}{3}\times\frac{4}{4}+\frac{1}{4}\times\frac{3}{3}\\&=\frac{6}{12}+\frac{4}{12}+\frac{3}{12}\\&=\frac{13}{12}\text{ or }1\frac{1}{12}\end{aligned}$$

50. $\frac{7}{8}-\frac{3}{5}=\frac{7}{8}\times\frac{5}{5}-\frac{3}{5}\times\frac{8}{8}=\frac{35}{40}-\frac{24}{40}=\frac{11}{40}$

51.
$$\begin{aligned}\frac{7}{30}+\frac{2}{21}&=\frac{7}{30}\times\frac{7}{7}+\frac{2}{21}\times\frac{10}{10}\\&=\frac{49}{210}+\frac{20}{210}\\&=\frac{69}{210}\\&=\frac{23}{70}\end{aligned}$$

52. $\frac{5}{18}+\frac{7}{10}=\frac{5}{18}\times\frac{5}{5}+\frac{7}{10}\times\frac{9}{9}=\frac{25}{90}+\frac{63}{90}=\frac{88}{90}=\frac{44}{45}$

53. $\frac{14}{15}-\frac{3}{25}=\frac{14}{15}\times\frac{5}{5}-\frac{3}{25}\times\frac{3}{3}=\frac{70}{75}-\frac{9}{75}=\frac{61}{75}$

54. $8-2\frac{3}{4}=\frac{32}{4}-\frac{11}{4}=\frac{21}{4}$ or $5\frac{1}{4}$

55. $3+5\frac{2}{3}=8\frac{2}{3}$

56.
$$\begin{array}{r} 3\frac{3}{8} \\ +\ 2\frac{3}{4} \\ \hline \end{array} \qquad \begin{array}{r} 3\frac{3}{8} \\ +\ 2\frac{6}{8} \\ \hline 5\frac{9}{8}=6\frac{1}{8} \end{array}$$

57.
$$\begin{array}{r} 5\frac{11}{16} \\ -\ 2\frac{1}{5} \\ \hline \end{array} \qquad \begin{array}{r} 5\frac{55}{80} \\ -\ 2\frac{16}{80} \\ \hline 3\frac{39}{80} \end{array}$$

58. $\frac{3}{5}\times\frac{1}{2}+\frac{2}{5}\div\frac{2}{3}=\frac{3}{5}\times\frac{1}{2}+\frac{2}{5}\times\frac{3}{2}=\frac{3}{10}+\frac{6}{10}=\frac{9}{10}$

59.
$$\left(\frac{4}{5}-\frac{1}{2}\right)^2\times\frac{10}{3}=\left(\frac{8}{10}-\frac{5}{10}\right)^2\times\frac{10}{3}$$
$$=\left(\frac{3}{10}\right)^2\times\frac{10}{3}$$
$$=\frac{9}{100}\times\frac{10}{3}$$
$$=\frac{3}{10}$$

60.
$$1\frac{7}{8}+2\frac{3}{4}+4\frac{1}{10}=1\frac{70}{80}+2\frac{60}{80}+4\frac{8}{80}$$
$$=7\frac{138}{80}$$
$$=8\frac{58}{80}$$
$$=8\frac{29}{40}$$

The total number of miles is $8\frac{29}{40}$ miles.

61.
$$\begin{array}{r} 28\frac{1}{6} \\ -\ 1\frac{5}{6} \\ \hline \end{array} \qquad \begin{array}{r} 27\frac{7}{6} \\ -\ 1\frac{5}{6} \\ \hline 26\frac{2}{6}=26\frac{1}{3} \end{array}$$

Then: $26\frac{1}{3}\times10\frac{3}{4}=\frac{79}{3}\times\frac{43}{4}=\frac{3397}{12}=283\frac{1}{12}$

She can drive $283\frac{1}{12}$ miles.

62. $3\frac{1}{3}\times\frac{1}{2}=\frac{10}{3}\times\frac{1}{2}=\frac{5}{3}=1\frac{2}{3}$ cups sugar

$4\frac{1}{4}\times\frac{1}{2}=\frac{17}{4}\times\frac{1}{2}=\frac{17}{8}=2\frac{1}{8}$ cups flour

63. $24\frac{1}{4}\times8\frac{1}{2}=\frac{97}{4}\times\frac{17}{2}=\frac{1649}{8}=206\frac{1}{8}$

He can drive approximately $206\frac{1}{8}$ miles.

64. $48\div3\frac{1}{5}=\frac{48}{1}\div\frac{16}{5}=\frac{48}{1}\times\frac{5}{16}=\frac{3}{1}\times\frac{5}{1}=15$

15 lengths can be cut from the pipe.

65. $15\frac{3}{4}-6\frac{1}{8}=15\frac{6}{8}-6\frac{1}{8}=9\frac{5}{8}$

It contains $9\frac{5}{8}$ liters of water.

66.
$$\begin{array}{r} 12 \\ 9 \\ +\ 14 \\ \hline 35 \end{array}$$

$35\div5=7$

$7\times32\frac{1}{2}=\frac{7}{1}\times\frac{65}{2}=\frac{455}{2}=227\frac{1}{2}$

It will take $227\frac{1}{2}$ minutes or 3 hours and

$47\frac{1}{2}$ minutes.

67. $2\frac{1}{2}\times1\frac{3}{4}=\frac{5}{2}\times\frac{7}{4}=\frac{5\times7}{2\times4}=\frac{35}{8}=4\frac{3}{8}$

She will need $\frac{35}{8}$ or $4\frac{3}{8}$ cups of flour.

$$\begin{array}{r} 12 \\ -\,4\frac{3}{8} \\ \hline \end{array} \qquad \begin{array}{r} 11\frac{8}{8} \\ -\,4\frac{3}{8} \\ \hline 7\frac{5}{8} \end{array}$$

There will be $7\frac{5}{8}$ cups of flour left in the bag.

68. $1\frac{1}{2}+\frac{1}{16}+\frac{1}{8}+\frac{1}{4}=1\frac{8}{16}+\frac{1}{16}+\frac{2}{16}+\frac{4}{16}=1\frac{15}{16}$

$3-1\frac{15}{16}=2\frac{16}{16}-1\frac{15}{16}=1\frac{1}{16}$

The bolt extends $1\frac{1}{16}$ inches.

69.
$$\begin{array}{r} \frac{1}{10}\times 880 = \quad 88 \\ \frac{1}{2}\times 880 = \quad 440 \\ +\,\frac{1}{8}\times 880 = +110 \\ \hline 638 \end{array}$$

Left over: $880 - 638 = 242$

She has \$242 left over.

70. $460\div 18\frac{2}{5}=\frac{460}{1}\div\frac{92}{5}=\frac{460}{1}\times\frac{5}{92}=25$

His car gets 25 miles per gallon.

71. $\frac{27}{63}=\frac{27\div 9}{63\div 9}=\frac{3}{7}$

72. $\frac{7}{5}+\frac{11}{25}=\frac{35}{75}+\frac{33}{75}=\frac{68}{75}$

73.
$$\begin{array}{r} 4\frac{1}{3} \\ -\,2\frac{11}{12} \\ \hline \end{array} \qquad \begin{array}{r} 4\frac{4}{12} \\ -\,2\frac{11}{12} \\ \hline \end{array} \qquad \begin{array}{r} 3\frac{16}{12} \\ -\,2\frac{11}{12} \\ \hline 1\frac{5}{12} \end{array}$$

74. $\frac{36}{49}\times\frac{14}{33}=\frac{3\times 12\times 2\times 7}{3\times 11\times 7\times 7}=\frac{24}{77}$

75. $\left(\frac{4}{7}\right)^3=\frac{4}{7}\times\frac{4}{7}\times\frac{4}{7}=\frac{64}{343}$

76. $\frac{3}{8}\div\frac{1}{10}=\frac{3}{8}\times\frac{10}{1}=\frac{3}{4}\times\frac{5}{1}=\frac{15}{4}$ or $3\frac{3}{4}$

77. $5\frac{1}{2}\times 18=\frac{11}{2}\times\frac{18}{1}=\frac{11}{1}\times\frac{9}{1}=99$

78. $150\div 3\frac{1}{8}=\frac{150}{1}\div\frac{25}{8}=\frac{150}{1}\times\frac{8}{25}=\frac{6}{1}\times\frac{8}{1}=48$

How Am I Doing? Chapter 2 Test

1. $\frac{3}{5}$; 3 of the 5 parts are shaded.

2. $\frac{\text{number that went in}}{\text{total number}}=\frac{311}{388}$

3. $\frac{18}{42}=\frac{18\div 6}{42\div 6}=\frac{3}{7}$

4. $\frac{15}{70}=\frac{15\div 5}{70\div 5}=\frac{3}{14}$

5. $\frac{225}{50}=\frac{225\div 25}{50\div 25}=\frac{9}{2}$

6. $6\frac{4}{5}=\frac{6\times 5+4}{5}=\frac{34}{5}$

7. $14\overline{)145}$ with $\underline{14}$ and remainder 5 $\qquad \frac{145}{14}=10\frac{5}{14}$

8. $42\times\frac{2}{7}=\frac{42}{1}\times\frac{2}{7}=\frac{6\times 7\times 2}{1\times 7}=\frac{12}{1}=12$

9. $\frac{7}{9}\times\frac{2}{5}=\frac{7\times 2}{9\times 5}=\frac{14}{45}$

10. $2\frac{2}{3}\times 5\frac{1}{4}=\frac{8}{3}\times\frac{21}{4}=\frac{2\times 4\times 3\times 7}{3\times 4}=14$

11. $\frac{7}{8}\div\frac{5}{11}=\frac{7}{8}\times\frac{11}{5}=\frac{7\times 11}{8\times 5}=\frac{77}{40}$ or $1\frac{37}{40}$

12. $\frac{12}{31} \div \frac{8}{13} = \frac{12}{31} \times \frac{13}{8} = \frac{3 \times 4 \times 13}{31 \times 2 \times 4} = \frac{39}{62}$

13. $7\frac{1}{5} \div 1\frac{1}{25} = \frac{36}{5} \div \frac{26}{25}$
$= \frac{36}{5} \times \frac{25}{26}$
$= \frac{2 \times 18 \times 5 \times 5}{5 \times 2 \times 13}$
$= \frac{18 \times 5}{13}$
$= \frac{90}{13}$ or $6\frac{12}{13}$

14. $5\frac{1}{7} \div 3 = \frac{36}{7} \div \frac{3}{1} = \frac{36}{7} \times \frac{1}{3} = \frac{3 \times 12 \times 1}{7 \times 3} = \frac{12}{7}$ or $1\frac{5}{7}$

15. $12 = 2 \times 2 \times 3$
$18 = 2 \times 3 \times 3$
LCD $= 2 \times 2 \times 3 \times 3 = 36$

16. $16 = 2 \times 2 \times 2 \times 2$
$24 = 2 \times 2 \times 2 \times 3$
LCD $= 2 \times 2 \times 2 \times 2 \times 3 = 48$

17. $4 = 2 \times 2$
$8 = 2 \times 2 \times 2$
$6 = 2 \times 3$
LCD $= 2 \times 2 \times 2 \times 3 = 24$

18. $\frac{5}{12} = \frac{5}{12} \times \frac{6}{6} = \frac{30}{72}$

19. $\frac{7}{9} - \frac{5}{12} = \frac{28}{36} - \frac{15}{36} = \frac{13}{36}$

20. $\frac{2}{15} + \frac{5}{12} = \frac{8}{60} + \frac{25}{60} = \frac{33}{60} = \frac{11}{20}$

21. $\frac{1}{4} + \frac{3}{7} + \frac{3}{14} = \frac{7}{28} + \frac{12}{28} + \frac{6}{28} = \frac{25}{28}$

22. $8\frac{3}{5} + 5\frac{4}{7} = 8\frac{21}{35} + 5\frac{20}{35} = 13\frac{41}{35} = 14\frac{6}{35}$

23. $18\frac{6}{7} - 13\frac{13}{14} = 18\frac{12}{14} - 13\frac{13}{14} = 17\frac{26}{14} - 13\frac{13}{14} = 4\frac{13}{14}$

24. $\frac{2}{9} \div \frac{8}{3} \times \frac{1}{4} = \frac{2}{9} \times \frac{3}{8} \times \frac{1}{4} = \frac{1}{48}$

25. $\left(\frac{1}{2} + \frac{1}{3}\right) \times \frac{7}{5} = \left(\frac{3}{6} + \frac{2}{6}\right) \times \frac{7}{5} = \frac{5}{6} \times \frac{7}{5} = \frac{7}{6}$ or $1\frac{1}{6}$

26. $16\frac{1}{2} \times 9\frac{1}{3} = \frac{33}{2} \times \frac{28}{3} = 11 \times 14 = 154$
The kitchen is 154 square feet.

27. $18\frac{2}{3} \div 2\frac{1}{3} = \frac{56}{3} \div \frac{7}{3} = \frac{56}{3} \times \frac{3}{7} = \frac{8 \times 7 \times 3}{3 \times 7} = 8$
He can make 8 packages.

28. $\frac{9}{10} - \frac{1}{5} = \frac{9}{10} - \frac{2}{10} = \frac{7}{10}$
He has $\frac{7}{10}$ of a mile left to walk.

29. $4\frac{1}{8} + 3\frac{1}{6} + 6\frac{3}{4} = 4\frac{3}{24} + 3\frac{4}{24} + 6\frac{18}{24}$
$= 13\frac{25}{24}$
$= 14\frac{1}{24}$
She jogged $14\frac{1}{24}$ miles.

30. $\frac{1}{4} \times 120 = \frac{1}{4} \times \frac{120}{1} = 30$
$\frac{1}{12} \times 120 = \frac{1}{12} \times \frac{120}{1} = 10$
$\frac{1}{3} \times 120 = \frac{1}{3} \times \frac{120}{1} = 40$
$120 - 30 - 10 - 40 = 40$
They shipped 40 oranges.

31. $48\frac{1}{8} \div \frac{5}{8} = \frac{385}{8} \times \frac{8}{5} = \frac{385}{5} = 77$
They can make 77 candles.
$2\frac{1}{2} \times \frac{5}{8} = \frac{5}{2} \times \frac{5}{8} = \frac{5 \times 5}{2 \times 8} = \frac{25}{16}$ or $1\frac{9}{16}$
It takes $\frac{25}{16}$ or $1\frac{9}{16}$ pounds of wax to make one pillar candle.