Basic College Mathematics 8th edition Tobey Solutions Manual

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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 $\frac{4}{11}$.

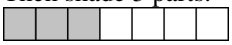
24. One out of eight equal parts is shaded. The fraction is $\frac{1}{8}$.

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

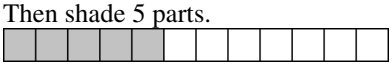
28. Seven out of twelve rectangles are shaded. The fraction is $\frac{7}{12}$.

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

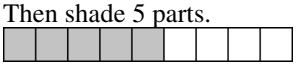
32. $\frac{3}{7}$; divide a rectangular bar into 7 equal parts. Then shade 3 parts.



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

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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. $119 = 7 \times 17$

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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.

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88. $\dfrac{1100+1700+900}{4500}=\dfrac{3700}{4500}$

$=\dfrac{3700\div100}{4500\div100}$

$=\dfrac{37}{45}$

$\dfrac{37}{45}$ 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. $\dfrac{77}{121}=\dfrac{7\times11}{11\times11}=\dfrac{7}{11}$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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32. $4\overline{)13}$

$\underline{12}$

1

$\frac{13}{4} = 3\frac{1}{4}$

34. $5\overline{)9}$

$\underline{5}$

4

$\frac{9}{5} = 1\frac{4}{5}$

36. $6\overline{)23}$

$\underline{18}$

5

$\frac{23}{6} = 3\frac{5}{6}$

38. $5\overline{)80}$

$\underline{5}$

30

$\underline{30}$

0

$\frac{80}{5} = 16$

40. $13\overline{)42}$

$\underline{39}$

3

$\frac{42}{13} = 3\frac{3}{13}$

42. $2\overline{)47}$

$\underline{4}$

7

$\underline{6}$

1

$\frac{47}{2} = 23\frac{1}{2}$

44. $17\overline{)54}$

$\underline{51}$

3

$\frac{54}{17} = 3\frac{3}{17}$

46. $3\overline{)19}$

$\underline{18}$

1

$\frac{19}{3} = 6\frac{1}{3}$

48. $10\overline{)83}$

$\underline{80}$

3

$\frac{83}{10} = 8\frac{3}{10}$

50. $11\overline{)132}$

$\underline{11}$

22

$\underline{22}$

0

$\frac{132}{11} = 12$

52. $7\overline{)183}$

$\underline{14}$

43

$\underline{42}$

1

$\frac{183}{7} = 26\frac{1}{7}$

54. $9\overline{)196}$

$\underline{18}$

16

$\underline{9}$

7

$\frac{196}{9} = 21\frac{7}{9}$

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56. $8\overline{)104}$

$\underline{8}$

24

$\underline{24}$

0

$\frac{104}{8} = 13$

58. $30\overline{)200}$

$\underline{180}$

20

$\frac{200}{30} = 6\frac{20}{30} = 6\frac{2}{3}$

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

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

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

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

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

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

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

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

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

72. $360\overline{)390}$

$\underline{360}$

30

$\frac{390}{360} = 1\frac{30}{360}$

$\frac{30}{360} = \frac{1\times 30}{12\times 30} = \frac{1}{12}$

$\frac{390}{360} = 1\frac{30}{360} = 1\frac{1}{12}$

74. $328\overline{)764}$

$\underline{656}$

108

$\frac{764}{328} = 2\frac{108}{328}$

$\frac{108}{328} = \frac{4\times 27}{4\times 82} = \frac{27}{82}$

$\frac{764}{328} = 2\frac{108}{328} = 2\frac{27}{82}$

76. $1000\overline{)2150}$

$\underline{2000}$

150

$\frac{2150}{1000} = 2\frac{150}{1000}$

$\frac{150}{1000} = \frac{3\times 50}{20\times 50} = \frac{3}{20}$

$\frac{2150}{1000} = 2\frac{150}{1000} = 2\frac{3}{20}$

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

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

80. $4\overline{)459}$

$\underline{4}$

05

$\underline{4}$

19

$\underline{16}$

3

$\frac{459}{4} = 114\frac{3}{4}$

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

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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 $11\frac{5}{7}$

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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.

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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. $\frac{78-41}{78}=\frac{37}{78}$

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

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

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

Classroom Quiz 2.4

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

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

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

2.5 Exercises

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

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

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

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

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

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

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

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

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

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

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

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

Division by 0 is undefined.

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

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

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

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

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

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

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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.
$$1\frac{7}{8} \div 3\frac{3}{4} = \frac{15}{8} \div \frac{15}{4}$$
$$= \frac{15}{8} \times \frac{4}{15}$$
$$= \frac{15 \times 4 \times 1}{2 \times 4 \times 15}$$
$$= \frac{1}{2}$$

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.
$$x \div \frac{2}{5} = \frac{15}{16}$$
$$x \cdot \frac{5}{2} = \frac{15}{16}$$
$$\frac{3}{8} \cdot \frac{5}{2} = \frac{15}{16}$$
$$x = \frac{3}{8}$$

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

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.
$$200 \div 4\frac{1}{6} = \frac{200}{1} \div \frac{25}{6}$$
$$= \frac{200}{1} \times \frac{6}{25}$$
$$= 8 \times 6$$
$$= 48$$

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.

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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 $\frac{3}{8}$.

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

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

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

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

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

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

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

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

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

11.
$$\begin{array}{r} 20 \\ 4\overline{)\,81} \\ \underline{8} \\ 01 \\ \underline{0} \\ 1 \end{array}$$
$$\frac{81}{4} = 20\frac{1}{4}$$

12.
$$\begin{array}{r} 5 \\ 5\overline{)\,29} \\ \underline{25} \\ 4 \end{array}$$
$$\frac{29}{5} = 5\frac{4}{5}$$

13.
$$\begin{array}{r} 2 \\ 17\overline{)\,36} \\ \underline{34} \\ 2 \end{array}$$
$$\frac{36}{17} = 2\frac{2}{17}$$

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

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

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

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

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

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

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

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.

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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.

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

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

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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.
$$\begin{array}{r} 8 \\ 14\overline{)125} \\ \underline{112} \\ 13 \end{array}$$

$\frac{125}{14}=8\frac{13}{14}$

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

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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. $8\frac{3}{8}$
$+\ 5\frac{3}{8}$
$13\frac{6}{8} = 13\frac{3}{4}$

4. $9\frac{5}{10}$
$-\ 2\frac{3}{10}$
$7\frac{2}{10} = 7\frac{1}{5}$

6. $5\frac{3}{14}$
$+\ 3\frac{5}{14}$
$8\frac{8}{14} = 8\frac{4}{7}$

8. $8\frac{2}{9}$
$+\ 7\frac{7}{9}$
$15\frac{9}{9} = 16$

10. 1
$-\ \frac{9}{11}$

$\frac{11}{11}$
$-\ \frac{9}{11}$
$\frac{2}{11}$

12. $1\frac{2}{3}$
$+\ \frac{13}{18}$

$1\frac{12}{18}$
$+\ \frac{13}{18}$
$1\frac{25}{18} = 2\frac{7}{18}$

14. $6\frac{2}{5}$
$+\ 7\frac{3}{20}$

$6\frac{8}{20}$
$+\ 7\frac{3}{20}$
$13\frac{11}{20}$

16. $9\frac{3}{4}$
$-\ 5\frac{1}{6}$

$9\frac{9}{12}$
$-\ 5\frac{2}{12}$
$4\frac{7}{12}$

18. $10\frac{10}{15}$
$-\ 10\frac{2}{3}$

$10\frac{10}{15}$
$-\ 10\frac{10}{15}$
0

20. 25
$-\ 14\frac{2}{11}$

$24\frac{11}{11}$
$-\ 14\frac{2}{11}$
$10\frac{9}{11}$

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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.

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48.
$$\begin{array}{r} 69\frac{15}{16} \\ -\,57\frac{13}{16} \\ \hline 12\frac{2}{16} = 12\frac{1}{8} \end{array}$$

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

50.
$$\begin{array}{r} 3\frac{3}{4} \\ -\,1\frac{2}{3} \\ \hline \end{array} \qquad \begin{array}{r} 3\frac{9}{12} \\ -\,1\frac{8}{12} \\ \hline 2\frac{1}{12} \end{array}$$

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

52. a.
$$\begin{array}{r} 17\frac{5}{8} \\ +\,13\frac{1}{2} \\ \hline \end{array} \qquad \begin{array}{r} 17\frac{5}{8} \\ +\,13\frac{4}{8} \\ \hline 30\frac{9}{8} = 31\frac{1}{8} \end{array}$$

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

b.
$$\begin{array}{r} 46 \\ -\,31\frac{1}{8} \\ \hline \end{array} \qquad \begin{array}{r} 45\frac{8}{8} \\ -\,31\frac{1}{8} \\ \hline 14\frac{7}{8} \end{array}$$

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

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

56. Estimate: $103 - 87 = 16$

Exact:
$$\begin{array}{r} 102\frac{5}{7} \\ -\,86\frac{2}{3} \\ \hline \end{array} \qquad \begin{array}{r} 102\frac{15}{21} \\ -\,86\frac{14}{21} \\ \hline 16\frac{1}{21} \end{array}$$

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.
$$\begin{aligned} \frac{3}{4} + \frac{1}{4} \div \frac{5}{3} &= \frac{3}{4} + \frac{1}{4} \times \frac{3}{5} \\ &= \frac{3}{4} + \frac{3}{20} \\ &= \frac{3}{4} \times \frac{5}{5} + \frac{3}{20} \\ &= \frac{15}{20} + \frac{3}{20} \\ &= \frac{18}{20} \\ &= \frac{9}{10} \end{aligned}$$

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

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

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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.

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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.

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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

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

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.

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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. $6 = 2\times3$
$10 = 2\times5$
$24 = 2\times2\times2\times3$
$\text{LCD} = 2\times2\times2\times3\times5 = 120$

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

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

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

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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.

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

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. $\frac{1}{10}\times 880 = 88$

$\frac{1}{2}\times 880 = 440$

$+\frac{1}{8}\times 880 = +110$

638

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. $14\overline{)145}$ R 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 $1\frac{37}{40}$

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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.

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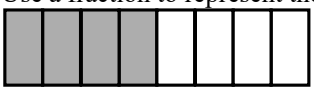
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Chapter 2 Pretest Form A

Name:_____

Date:_____

1. Use a fraction to represent the shaded portion of the object shown. **1.** _____



2. Draw a sketch to show $\frac{2}{5}$ of an object. **2.** _____

3. Tom bought 47 apples. Of these, six were rotten. Write a fraction that describes the proportion of apples that were rotten. **3.** _____

For problems 4 – 7, simplify each fraction.

4. $\frac{4}{24}$ **4.** _____

5. $\frac{15}{45}$ **5.** _____

6. $\frac{17}{119}$ **6.** _____

7. $\frac{125}{200}$ **7.** _____

For problems 8 – 9, change each mixed number to an improper fraction.

8. $4\frac{1}{3}$ **8.** _____

9. $7\frac{2}{9}$ **9.** _____

For problems 10 – 11, change each improper fraction to a mixed number.

10. $\frac{79}{4}$ **10.** _____

11. $\frac{41}{17}$ **11.** _____

For problems 12 – 17, multiply or divide as indicated. Simplify final answers.

12. $\frac{3}{7}\times\frac{1}{8}$ **12.** _____

13. $\frac{4}{11}\times\frac{33}{28}$ **13.** _____

14. $8\frac{1}{3}\times 6\frac{1}{2}$ **14.** _____

15. $\frac{3}{17}\div\frac{3}{34}$ **15.** _____

16. $3\frac{3}{7}\div 2\frac{2}{21}$ **16.** _____

17. $12\div\frac{8}{7}$ **17.** _____

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Chapter 2 Pretest Form A *(cont.)* Name:_____

For problems 18 – 20, find the least common denominator of the fractions listed.

18. $\frac{1}{6}, \frac{3}{4}, \frac{1}{2}$ **18.** _____

19. $\frac{2}{5}, \frac{7}{45}$ **19.** _____

20. $\frac{9}{25}, \frac{11}{15}$ **20.** _____

21. Change $\frac{5}{12}$ to an equivalent fraction with 84 as its denominator. **21.** _____

For problems 22 – 25, add or subtract as indicated. Simplify final answers.

22. $\frac{8}{15} - \frac{1}{20}$ **22.** _____

23. $\frac{7}{9} - \frac{1}{12} + \frac{5}{18}$ **23.** _____

24. $9 - 2\frac{1}{3}$ **24.** _____

25. $2\frac{1}{6} + 3\frac{5}{7}$ **25.** _____

26. Simplify: $\frac{2}{7} \times \frac{7}{9} \div \frac{5}{3}$ **26.** _____

27. Simplify: $\frac{2}{3} + \frac{1}{2} \times \frac{8}{9}$ **27.** _____

28. Tuan and Frank set out to walk $17\frac{1}{2}$ miles from Alexandria to Manassas. During the first 5 hours, they covered $9\frac{1}{3}$ miles going from Alexandria to Bedford. How many miles are left to be covered from Bedford to Manassas? **28.** _____

29. Barbara picked $7\frac{1}{4}$ bushels of peppers. Her son picked $2\frac{1}{18}$ bushels of peppers. How much did they pick together? **29.** _____

30. A history textbook weighs $2\frac{7}{16}$ pounds. How much will a box of 24 of these textbooks weigh? **30.** _____

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Chapter 2 Pretest Form B

Name:_____

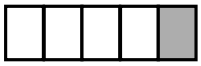
Date:_____

1. What fraction best represents the shaded portions of this object:



a. $\frac{2}{8}$ **b.** $\frac{6}{8}$ **c.** $\frac{5}{8}$ **d.** $\frac{1}{7}$

2. Which of the following objects best depicts the fraction: $\frac{3}{5}$

a.  **b.**  **c.**  **d.** 

3. Tom bought 43 apples. Of these, 8 were rotten. Write a fraction that bests describe to portion of apples that were rotten.

a. $\frac{43}{8}$ **b.** $\frac{8}{43}$ **c.** $\frac{1}{8}$ **d.** $\frac{1}{4}$

For problems 4 – 7, simplify each fraction.

4. $\frac{5}{35}$ **a.** $\frac{1}{35}$ **b.** $\frac{5}{7}$ **c.** $\frac{1}{5}$ **d.** $\frac{1}{7}$

5. $\frac{15}{75}$ **a.** $\frac{1}{5}$ **b.** $\frac{1}{3}$ **c.** $\frac{3}{25}$ **d.** $\frac{5}{25}$

6. $\frac{9}{207}$ **a.** $\frac{1}{90}$ **b.** $\frac{1}{23}$ **c.** $\frac{3}{19}$ **d.** $\frac{1}{19}$

7. $\frac{150}{200}$ **a.** $\frac{1}{3}$ **b.** $\frac{3}{4}$ **c.** $\frac{1}{2}$ **d.** $\frac{3}{5}$

For problems 8 – 9, change each mixed number to an improper fraction.

8. $5\frac{2}{3}$ **a.** $\frac{10}{3}$ **b.** $\frac{30}{3}$ **c.** $\frac{16}{3}$ **d.** $\frac{17}{3}$

9. $8\frac{2}{7}$ **a.** $\frac{58}{7}$ **b.** $\frac{23}{7}$ **c.** $\frac{17}{7}$ **d.** $\frac{112}{7}$

For problems 10 – 11, change each improper fraction to a mixed number.

10. $\frac{85}{4}$ **a.** $21\frac{1}{2}$ **b.** $21\frac{3}{4}$ **c.** $21\frac{1}{4}$ **d.** $22\frac{1}{4}$

11. $\frac{43}{17}$ **a.** $2\frac{10}{17}$ **b.** $3\frac{1}{17}$ **c.** $2\frac{9}{17}$ **d.** $2\frac{11}{17}$

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Chapter 2 Pretest Form B *(cont.)* Name:_____

For problems 12 – 17, multiply or divide as indicated. Simplify final answers.

12. $\frac{5}{7}\times\frac{1}{6}$ **a.** $\frac{5}{42}$ **b.** $\frac{5}{13}$ **c.** $\frac{30}{7}$ **d.** $\frac{7}{30}$

13. $\frac{5}{8}\times\frac{32}{35}$ **a.** $\frac{4}{7}$ **b.** $\frac{7}{4}$ **c.** $\frac{175}{256}$ **d.** $1\frac{4}{7}$

14. $11\frac{1}{3}\times 4\frac{1}{2}$ **a.** $44\frac{1}{6}$ **b.** 51 **c.** $44\frac{1}{5}$ **d.** $1\frac{7}{27}$

15. $\frac{4}{34}\div\frac{4}{17}$ **a.** $1\frac{1}{2}$ **b.** 2 **c.** $\frac{8}{289}$ **d.** $\frac{1}{2}$

16. $4\frac{5}{7}\div 2\frac{2}{21}$ **a.** $2\frac{1}{4}$ **b.** $2\frac{1}{8}$ **c.** $\frac{175}{336}$ **d.** $1\frac{49}{50}$

17. $9\div\frac{18}{7}$ **a.** $3\frac{1}{7}$ **b.** $3\frac{1}{2}$ **c.** $\frac{2}{7}$ **d.** $1\frac{2}{7}$

For problems 18 – 20, find the least common denominator of the fractions listed.

18. $\frac{1}{10},\frac{3}{2},\frac{1}{5}$ **a.** 20 **b.** 10 **c.** 15 **d.** 100

19. $\frac{2}{14},\frac{6}{49}$ **a.** 7 **b.** 28 **c.** 98 **d.** 49

20. $\frac{9}{39},\frac{11}{26}$ **a.** 6 **b.** 78 **c.** 117 **d.** 3

21. Change $\frac{7}{15}$ to an equivalent fraction with 75 as it denominator.

a. $\frac{5}{75}$ **b.** $\frac{12}{75}$ **c.** $\frac{35}{75}$ **d.** $\frac{7}{75}$

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Chapter 2 Pretest Form B *(cont.)* Name:_____

For problems 22 – 25, add or subtract as indicated. Simplify final answers.

22. $\frac{8}{15}-\frac{3}{20}$ **a.** $\frac{7}{20}$ **b.** $\frac{23}{60}$ **c.** 1 **d.** $\frac{5}{60}$

23. $\frac{2}{9}-\frac{5}{12}+\frac{7}{18}$ **a.** $\frac{7}{39}$ **b.** $\frac{5}{9}$ **c.** $\frac{5}{39}$ **d.** $\frac{7}{36}$

24. $7-2\frac{2}{3}$ **a.** $4\frac{1}{3}$ **b.** $5\frac{2}{3}$ **c.** $5\frac{1}{3}$ **d.** $4\frac{2}{3}$

25. $3\frac{1}{6}+2\frac{4}{7}$ **a.** $5\frac{5}{13}$ **b.** $5\frac{31}{42}$ **c.** $\frac{9}{14}$ **d.** $2\frac{1}{13}$

26. Simplify: $\frac{2}{9}\times\frac{9}{7}\div\frac{5}{3}$

a. $\frac{10}{21}$ **b.** $\frac{12}{35}$ **c.** $\frac{6}{35}$ **d.** $\frac{2}{105}$

27. Simplify: $\frac{2}{3}+\frac{1}{2}\times\frac{8}{9}$

a. $1\frac{2}{9}$ **b.** $2\frac{1}{18}$ **c.** $1\frac{1}{27}$ **d.** $1\frac{1}{9}$

28. Tuan and Frank set out to walk the $26\frac{1}{2}$ miles from Alexandria to Lorton. During the first 5 hours, they covered $14\frac{2}{3}$ miles going from Alexandria to Bedford. How many miles are left to be covered from Bedford to Lorton?

a. $11\frac{5}{6}$ miles **b.** $9\frac{2}{3}$ miles **c.** $11\frac{1}{3}$ miles **d.** $19\frac{1}{2}$ miles

29. Barbara picked $9\frac{3}{4}$ bushels of peppers. Her son picked $2\frac{1}{18}$ bushels of peppers. How much did they pick together?

a. $11\frac{1}{24}$ bushels **b.** $11\frac{2}{11}$ bushels **c.** $7\frac{25}{36}$ bushels **d.** $11\frac{29}{36}$ bushels

30. A pallet of cement landscaping blocks weighs 4176 pounds. If a single cement block weighs $3\frac{5}{8}$ pounds, how many blocks are on the pallet?

a. 15,138 blocks **b.** 1392 blocks **c.** 1152 blocks **d.** 12,528 blocks

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Chapter 2 Test Form A

Name:_____

Date:_____

For problems 1 – 2, simplify each fraction.

1. $\frac{15}{65}$ **1.** _____

2. $\frac{54}{81}$ **2.** _____

3. Change $6\frac{2}{5}$ to an improper fraction. **3.** _____

4. Change $\frac{71}{33}$ to a mixed number. **4.** _____

For problems 5 – 8, multiply or divide as indicated. Simplify final answers.

5. $\frac{4}{7} \times \frac{11}{15}$ **5.** _____

6. $\frac{9}{10} \div \frac{12}{5}$ **6.** _____

7. $5\frac{1}{4} \times 3\frac{5}{7}$ **7.** _____

8. $5\frac{3}{5} \div 1\frac{13}{15}$ **8.** _____

9. What is the LCD for $\frac{7}{16}$ and $\frac{5}{36}$? **9.** _____

10. Change $\frac{13}{24}$ to an equivalent fraction with 120 as its denominator. **10.** _____

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Chapter 2 Test Form A *(cont.)*

Name:_____

For problems 11 – 15, add or subtract as indicated. Simplify final answers.

11. $7\frac{1}{3}+8\frac{5}{6}$ **11.** _____

12. $9-3\frac{3}{4}$ **12.** _____

13. $\frac{1}{8}+\frac{1}{4}+\frac{1}{2}$ **13.** _____

14. $7\frac{3}{4}+13\frac{1}{4}$ **14.** _____

15. $\frac{71}{30}-\frac{9}{5}$ **15.** _____

16. Simplify: $\frac{5}{8}+\frac{3}{4}\div\frac{9}{16}$ **16.** _____

17. Mary Ann had $\frac{5}{8}$ pound of candy. She gave $\frac{2}{3}$ of it to a friend. How much candy did she have left? **17.** _____

18. A butcher has $50\frac{3}{4}$ pounds of ground beef. He wishes to prepare it in $1\frac{1}{4}$ pound packages. How many packages can he prepare? **18.** _____

19. Jeremy bought a bolt of fabric. He sold $\frac{3}{4}$ of it to a dressmaker, gave $\frac{1}{8}$ of it to a friend, and put the rest in his store. What portion of the bolt did he put in his store? **19.** _____

20. David and Michael bought an brought home two large pizzas. David ate $\frac{3}{4}$ of a pizza, while Michael ate $\frac{3}{8}$ of a pizza. How much pizza was left for their father when he came home? **20.** _____

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Chapter 2 Test Form B

Name:_____

Date:_____

For problems 1 – 2, simplify each fraction.

1. $\frac{18}{60}$ **1.** _____

2. $\frac{77}{330}$ **2.** _____

3. Change $3\frac{2}{7}$ to an improper fraction. **3.** _____

4. Change $\frac{57}{13}$ to a mixed number. **4.** _____

For problems 5 – 8, multiply or divide as indicated. Simplify final answers.

5. $\frac{7}{12} \times \frac{5}{4}$ **5.** _____

6. $\frac{5}{13} \div \frac{70}{26}$ **6.** _____

7. $4\frac{2}{5} \times 5\frac{5}{6}$ **7.** _____

8. $1\frac{11}{14} \div 2\frac{1}{7}$ **8.** _____

9. What is the LCD for $\frac{19}{34}$ and $\frac{11}{24}$? **9.** _____

10. Change $\frac{12}{25}$ to an equivalent fraction with 125 as its denominator. **10.** _____

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Chapter 2 Test Form B *(cont.)*

Name:_____

For problems 11 – 15, add or subtract as indicated. Simplify final answers.

11. $9\frac{2}{5}+1\frac{1}{4}$ **11.** _____

12. $\frac{4}{9}+\frac{12}{15}$ **12.** _____

13. $13 - 7\frac{5}{8}$ **13.** _____

14. $\frac{2}{5}+\frac{2}{7}+\frac{1}{35}$ **14.** _____

15. $\frac{49}{20} - 1\frac{9}{20}$ **15.** _____

16. Simplify: $\frac{7}{8}+\frac{1}{4}\times\frac{2}{3}$ **16.** _____

17. A rectangular flowerbed measures $9\frac{1}{2}$ feet by $4\frac{1}{4}$ feet. Find the area of the bed in square feet. **17.** _____

18. How many $\frac{3}{4}$ ounce seed packets can be prepared from $88\frac{1}{2}$ ounces of marigold seeds? **18.** _____

19. Jeff bought two cords of firewood. He gave $\frac{1}{2}$ to his minister, and $\frac{7}{8}$ cord to his brother. How much firewood was left? **19.** _____

20. Katie is making chocolate chip cookies. Her recipe calls for $\frac{5}{8}$ cup sugar, but Katie wants to multiply the recipe so that she will get $1\frac{1}{2}$ times as many cookies. How much sugar should she use? **20.** _____

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Chapter 2 Test Form C

Name:_____

Date:_____

For problems 1 – 2, simplify each fraction.

1. $\frac{30}{96}$ **1.** _____

2. $\frac{110}{280}$ **2.** _____

3. Change $4\frac{3}{8}$ to an improper fraction. **3.** _____

4. Change $\frac{77}{17}$ to a mixed number. **4.** _____

For problems 5 – 8, multiply or divide as indicated. Simplify final answers.

5. $\frac{1}{11} \times \frac{5}{13}$ **5.** _____

6. $\frac{5}{19} \div \frac{10}{3}$ **6.** _____

7. $4\frac{1}{12} \times 1\frac{13}{14}$ **7.** _____

8. $6\frac{1}{4} \div 15\frac{5}{8}$ **8.** _____

9. What is the LCD for $\frac{19}{35}$ and $\frac{7}{60}$? **9.** _____

10. Change $\frac{8}{35}$ to an equivalent fraction with 315 as its denominator. **10.** _____

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Chapter 2 Test Form C *(cont.)*

Name:_____

For problems 11 – 15, add or subtract as indicated. Simplify final answers.

11. $4\frac{1}{5}+1\frac{3}{10}$ **11.** _____

12. $\frac{1}{8}+\frac{1}{2}+\frac{1}{5}$ **12.** _____

13. $11\frac{1}{8}-5\frac{5}{8}$ **13.** _____

14. $4\frac{1}{5}+11\frac{3}{8}$ **14.** _____

15. $\frac{15}{8}-\frac{6}{5}$ **15.** _____

16. Simplify: $\left(\frac{5}{6}-\frac{3}{4}\right)\times\frac{9}{10}$ **16.** _____

17. A hallway measures $8\frac{2}{5}$ feet by $16\frac{3}{8}$ feet. Find the area of the hallway in square feet. **17.** _____

18. Tim wants to parcel out 60 pounds of dry dog food into $\frac{1}{3}$ pound packages. How many packages can he make? **18.** _____

19. Victoria purchased a crate of strawberries. She gave $\frac{1}{3}$ of them to friends at work and $\frac{3}{8}$ of them to her sister. She froze the rest. What part of the crate did she freeze? **19.** _____

20. A carpenter has a board that is $10\frac{3}{16}$ inches long. He needs a piece of wood that is $7\frac{5}{8}$ inches long. How long will the remaining piece be? **20.** _____

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Chapter 2 Test Form D

Name:_____

Date:_____

For problems 1 – 2, simplify the fraction.

1. $\frac{42}{98}$ **a.** $\frac{4}{7}$ **b.** $\frac{3}{7}$ **c.** $\frac{3}{8}$ **d.** $\frac{7}{9}$

2. $\frac{16}{38}$ **a.** $\frac{8}{9}$ **b.** $\frac{16}{38}$ **c.** $\frac{4}{9}$ **d.** $\frac{8}{19}$

3. Change $2\frac{5}{7}$ to an improper fraction.

a. $\frac{14}{7}$ **b.** $\frac{37}{7}$ **c.** $\frac{19}{7}$ **d.** $\frac{19}{5}$

4. Change $\frac{65}{18}$ to a mixed number.

a. $3\frac{11}{18}$ **b.** $3\frac{1}{18}$ **c.** $3\frac{10}{18}$ **d.** $4\frac{1}{18}$

For problems 5 – 8, multiply or divide as indicated. Simplify final answers.

5. $\frac{4}{7}\times\frac{3}{11}$ **a.** $\frac{12}{77}$ **b.** $\frac{33}{28}$ **c.** $\frac{7}{77}$ **d.** $\frac{12}{18}$

6. $\frac{6}{10}\div\frac{12}{7}$ **a.** $\frac{36}{35}$ **b.** $\frac{20}{7}$ **c.** $\frac{15}{35}$ **d.** $\frac{7}{20}$

7. $5\frac{1}{7}\times3\frac{1}{9}$ **a.** $15\frac{1}{63}$ **b.** $1\frac{32}{49}$ **c.** $3\frac{9}{63}$ **d.** 16

8. $6\frac{3}{7}\div1\frac{13}{14}$ **a.** $12\frac{39}{98}$ **b.** $6\frac{6}{13}$ **c.** $3\frac{1}{3}$ **d.** $6\frac{39}{98}$

9. What is the LCD for $\frac{11}{21}$ and $\frac{31}{45}$?

a. 945 **b.** 315 **c.** 66 **d.** 105

10. Change $\frac{7}{8}$ to an equivalent fraction with 56 as its denominator.

a. $\frac{55}{56}$ **b.** $\frac{42}{56}$ **c.** $\frac{48}{56}$ **d.** $\frac{49}{56}$

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Chapter 2 Test Form D *(cont.)*

Name:_____

For problems 11 – 15, add or subtract as indicated. Simplify final answers.

11. $\frac{3}{7}+\frac{5}{14}$

a. $\frac{8}{14}$ **b.** $\frac{11}{14}$ **c.** $\frac{4}{7}$ **d.** $\frac{8}{21}$

12. $5+4\frac{2}{7}$

a. $9\frac{2}{7}$ **b.** $20\frac{2}{7}$ **c.** $1\frac{2}{7}$ **d.** $9\frac{5}{7}$

13. $12\frac{2}{5}-5\frac{1}{10}$

a. $7\frac{1}{5}$ **b.** $7\frac{1}{10}$ **c.** $7\frac{3}{10}$ **d.** $7\frac{4}{10}$

14. $2\frac{2}{5}+3\frac{1}{4}$

a. $5\frac{1}{3}$ **b.** $\frac{25}{9}$ **c.** $5\frac{13}{20}$ **d.** $12\frac{5}{9}$

15. $7\frac{5}{9}-3\frac{7}{9}$

a. $4\frac{2}{9}$ **b.** $3\frac{7}{9}$ **c.** $2\frac{7}{9}$ **d.** $4\frac{5}{9}$

16. Simplify $\left(\frac{1}{2}+\frac{1}{3}\right)\div\frac{15}{4}$

a. $3\frac{1}{8}$ **b.** $\frac{53}{90}$ **c.** $\frac{2}{9}$ **d.** $\frac{8}{75}$

17. A rectangular garden measures $6\frac{1}{5}$ yards by $9\frac{1}{2}$ yards. What is the area of the garden?

a. $62\frac{15}{19}$ sq. yd. **b.** $32\frac{1}{4}$ sq. yd. **c.** $54\frac{5}{16}$ sq. yd. **d.** $58\frac{9}{10}$ sq. yd.

18. A landscape designer had $50\frac{2}{3}$ pounds of seeds that she wishes to parcel into packages of $\frac{2}{3}$ pound each. How many packages can she make?

a. 76 packages **b.** $33\frac{7}{9}$ packages **c.** 50 packages **d.** 60 packages

19. Maggie bought a crate of oranges. She gave $\frac{1}{3}$ of the crate to friends, and $\frac{1}{2}$ of the crate to family. What portion of the crate did she have left?

a. $\frac{3}{5}$ crate **b.** $\frac{5}{6}$ crate **c.** $\frac{1}{6}$ crate **d.** $\frac{2}{5}$ crate

20. Dave jogged $6\frac{1}{2}$ miles on Monday, $3\frac{1}{4}$ miles on Tuesday, and $3\frac{3}{4}$ miles on Wednesday. What is his total mileage for these three days?

a. $14\frac{1}{4}$ miles **b.** $12\frac{1}{2}$ miles **c.** 13 miles **d.** $13\frac{1}{2}$ miles

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Chapter 2 Test Form E

Name:_____

Date:_____

For problems 1 – 2, simplify the fraction.

1. $\frac{26}{130}$ **a.** $\frac{1}{7}$ **b.** $\frac{1}{5}$ **c.** $\frac{1}{13}$ **d.** $\frac{1}{4}$

2. $\frac{68}{140}$ **a.** $\frac{1}{2}$ **b.** $\frac{2}{35}$ **c.** $\frac{17}{25}$ **d.** $\frac{17}{35}$

3. Change $2\frac{5}{14}$ to an improper fraction.

a. $\frac{33}{14}$ **b.** $\frac{33}{28}$ **c.** $\frac{30}{14}$ **d.** $\frac{35}{14}$

4. Change $\frac{35}{11}$ to a mixed number.

a. $3\frac{1}{11}$ **b.** $2\frac{13}{11}$ **c.** $3\frac{2}{11}$ **d.** $3\frac{3}{11}$

For problems 5 – 8, multiply or divide as indicated. Simplify final answers.

5. $\frac{3}{5}\times\frac{9}{10}$ **a.** $\frac{27}{25}$ **b.** $\frac{12}{50}$ **c.** $\frac{12}{15}$ **d.** $\frac{27}{50}$

6. $2\frac{1}{5}\div\frac{31}{5}$ **a.** $\frac{52}{5}$ **b.** $\frac{11}{31}$ **c.** $\frac{31}{11}$ **d.** $\frac{341}{25}$

7. $6\frac{3}{14}\times3\frac{1}{9}$ **a.** $9\frac{1}{42}$ **b.** $5\frac{1}{9}$ **c.** $19\frac{1}{3}$ **d.** $18\frac{1}{42}$

8. $7\frac{7}{9}\div2\frac{8}{21}$ **a.** $1\frac{68}{93}$ **b.** $5\frac{8}{27}$ **c.** $18\frac{14}{27}$ **d.** $3\frac{4}{15}$

9. What is the LCD for $\frac{11}{28}$ and $\frac{17}{49}$?

a. 945 **b.** 1372 **c.** 196 **d.** 98

10. Change $\frac{7}{16}$ to an equivalent fraction with 256 as its denominator.

a. $\frac{112}{256}$ **b.** $\frac{49}{256}$ **c.** $\frac{247}{256}$ **d.** $\frac{98}{256}$

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Chapter 2 Test Form E *(cont.)*

Name:_____

For problems 11 – 15, add or subtract as indicated. Simplify final answers.

11. $8\frac{5}{6}+3\frac{7}{9}$

a. $9\frac{11}{18}$ **b.** $11\frac{12}{15}$ **c.** $19\frac{5}{9}$ **d.** $9\frac{2}{3}$

12. $\frac{1}{3}+\frac{1}{5}+\frac{1}{6}$

a. $\frac{11}{30}$ **b.** $\frac{3}{14}$ **c.** $\frac{7}{10}$ **d.** $\frac{3}{30}$

13. $\frac{7}{8}-\frac{2}{5}$

a. $\frac{5}{40}$ **b.** $\frac{5}{8}$ **c.** $\frac{19}{40}$ **d.** $\frac{5}{3}$

14. $4\frac{5}{6}+13\frac{2}{3}$

a. $18\frac{5}{6}$ **b.** $18\frac{1}{2}$ **c.** $18\frac{1}{6}$ **d.** $17\frac{1}{2}$

15. $\frac{11}{15}-\frac{2}{9}$

a. $\frac{13}{45}$ **b.** $\frac{3}{2}$ **c.** $\frac{5}{9}$ **d.** $\frac{23}{45}$

16. Simplify $\frac{7}{8}-\frac{3}{4}\times\frac{5}{6}$

a. $\frac{1}{4}$ **b.** $\frac{5}{48}$ **c.** $1\frac{1}{2}$ **d.** $\frac{5}{6}$

17. Monica had $\frac{3}{4}$ pound of candy. She gave $\frac{2}{3}$ of it to Leann. How much candy did she give to Leann?

a. $\frac{15}{8}$ pound **b.** $\frac{1}{2}$ pound **c.** $\frac{7}{20}$ pound **d.** $\frac{8}{15}$ pound

18. How many $\frac{1}{2}$ pound packages of peanuts can be prepared from $12\frac{1}{2}$ pounds of peanuts?

a. $6\frac{1}{4}$ packages **b.** 12 packages **c.** 25 packages **d.** 6 packages

19. Jared bought a bushel of apples. He gave $\frac{1}{4}$ to his brothers and $\frac{1}{5}$ to the mailman. What portion of the bushel did he have left?

a. $\frac{11}{20}$ bushel **b.** $\frac{9}{9}$ bushel **c.** $\frac{9}{29}$ bushel **d.** $\frac{2}{9}$ bushel

20. Midway High School has a track for runners that is one-quarter mile in length. Sheila ran a total of 11 times around the track. Her sister Nancy ran 25 laps around the track. How much further did Nancy run than Sheila?

a. $3\frac{1}{4}$ miles **b.** $3\frac{1}{2}$ miles **c.** $2\frac{1}{2}$ miles **d.** 4 miles

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Chapter 2 Test Form F

Name:_____

Date:_____

For problems 1 – 2, simplify the fraction.

1. $\frac{18}{48}$ **a.** $\frac{3}{6}$ **b.** $\frac{3}{8}$ **c.** $\frac{1}{3}$ **d.** $\frac{1}{7}$

2. $\frac{17}{70}$ **a.** $\frac{17}{70}$ **b.** $\frac{17}{30}$ **c.** $\frac{3}{70}$ **d.** $\frac{7}{70}$

3. Change $4\frac{3}{7}$ to an improper fraction.

a. $\frac{43}{7}$ **b.** $\frac{12}{7}$ **c.** $\frac{31}{3}$ **d.** $\frac{31}{7}$

4. Change $\frac{71}{12}$ to a mixed number.

a. $5\frac{7}{12}$ **b.** $5\frac{11}{12}$ **c.** $4\frac{7}{12}$ **d.** $5\frac{5}{12}$

For problems 8 – 9, multiply or divide as indicated. Simplify final answers.

5. $\frac{2}{5}\times\frac{7}{23}$ **a.** $\frac{14}{115}$ **b.** $\frac{14}{28}$ **c.** $\frac{9}{115}$ **d.** $\frac{24}{115}$

6. $\frac{9}{11}\div\frac{13}{7}$ **a.** $\frac{117}{77}$ **b.** $\frac{63}{143}$ **c.** $\frac{53}{117}$ **d.** $\frac{63}{133}$

7. $1\frac{7}{18}\times 2\frac{7}{10}$ **a.** $3\frac{5}{9}$ **b.** $2\frac{23}{36}$ **c.** $3\frac{3}{4}$ **d.** $2\frac{49}{180}$

8. $8\frac{1}{15}\div 2\frac{13}{21}$ **a.** $21\frac{8}{63}$ **b.** $4\frac{7}{65}$ **c.** 77 **d.** $3\frac{2}{25}$

9. What is the LCD for $\frac{9}{49}$ and $\frac{11}{48}$?

a. 98 **b.** 144 **c.** 336 **d.** 2352

10. Change $\frac{11}{12}$ to an equivalent fraction with 156 as its denominator.

a. $\frac{132}{156}$ **b.** $\frac{155}{156}$ **c.** $\frac{143}{156}$ **d.** $\frac{154}{156}$

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Chapter 2 Test Form F *(cont.)*

Name:_____

For problems 11 – 15, add or subtract as indicated. Simplify final answers.

11. $6\frac{12}{13}+\frac{1}{2}$

a. $7\frac{5}{26}$ **b.** $7\frac{11}{26}$ **c.** $3\frac{12}{13}$ **d.** $10\frac{5}{13}$

12. $18-7\frac{1}{4}$

a. $10\frac{1}{2}$ **b.** $10\frac{1}{4}$ **c.** $11\frac{3}{4}$ **d.** $10\frac{3}{4}$

13. $\frac{3}{8}+\frac{1}{4}+\frac{5}{12}$

a. $\frac{14}{12}$ **b.** $\frac{9}{24}$ **c.** $2\frac{1}{24}$ **d.** $1\frac{1}{24}$

14. $11\frac{1}{4}-6\frac{3}{4}$

a. $5\frac{1}{4}$ **b.** $4\frac{3}{4}$ **c.** $5\frac{1}{4}$ **d.** $4\frac{1}{2}$

15. $3\frac{1}{4}+4\frac{1}{3}$

a. $7\frac{7}{12}$ **b.** $7\frac{5}{12}$ **c.** $7\frac{2}{7}$ **d.** $8\frac{7}{12}$

16. Simplify $\frac{9}{8}-\frac{3}{4}\div\frac{6}{5}$

a. $\frac{5}{16}$ **b.** $\frac{1}{2}$ **c.** $\frac{9}{40}$ **d.** $\frac{9}{20}$

17. Janie had a large bag of candy. She gave $\frac{1}{3}$ of it to her coworkers, $\frac{1}{2}$ of it to her mother, and took the rest home. What portion of the bag did she take home?

a. $\frac{5}{6}$ bag **b.** $\frac{2}{5}$ bag **c.** $\frac{3}{5}$ bag **d.** $\frac{1}{6}$ bag

18. How many $\frac{2}{3}$ ounce packages of spices can be prepared from 100 ounces of spices?

a. $66\frac{2}{3}$ packages **b.** 100 packages **c.** 300 packages **d.** 150 packages

19. Tom built a rectangular kennel measuring $20\frac{1}{2}$ feet by 25 feet. What is the area of the kennel?

a. 91 sq. ft. **b.** $512\frac{1}{2}$ sq. ft. **c.** $587\frac{1}{2}$ sq. ft. **d.** 510 sq. ft.

20. Ethan bought a $12\frac{1}{2}$-ounce bag of peanuts. His sister Anna bought $7\frac{3}{5}$-ounce bag of peanuts. How many ounces of peanuts do the two siblings have altogether?

a. $4\frac{9}{10}$ ounces **b.** $19\frac{4}{7}$ ounces **c.** $20\frac{1}{10}$ ounces **d.** $19\frac{3}{10}$ ounces

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Chapters 1–2 Cumulative Test Form A

Name:_____

Date:_____

1. Add: $\begin{array}{r} 2953 \\ 467 \\ +\ 381 \\ \hline \end{array}$ **1.** _____

2. Subtract: $\begin{array}{r} 49{,}108 \\ -2{,}559 \\ \hline \end{array}$ **2.** _____

3. Multiply: $3 \times 10 \times 4 \times 8$ **3.** _____

4. Divide: $6\overline{)9408}$ **4.** _____

5. Write in exponent form: $7 \times 7 \times 7 \times 7 \times 7$ **5.** _____

6. Round to the nearest hundred: 25,738 **6.** _____

7. Perform the operations the proper order: **7.** _____
$3^2 + 4 \times 7 \div 4 + 5^2 - 15 \div 3$

8. Amy drove from Chicago to Washington, a distance of 450 miles. She started with a full tank of gas. In Washington, she filled her tank again, and it needed 12 gallons. How many miles per gallon did her car get? **8.** _____

9. Thirty-five fraternity brothers rented a bus for a ski trip for a total cost of $539. How much did each one pay? **9.** _____

10. A biology class consists of 8 freshmen, 12 sophomores, and 5 juniors. What fractional part of the class are not freshmen? **10.** _____

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Chapters 1–2 Cumulative Test Form A *(cont.)*

Name:_____

11. Simplify: $\frac{96}{280}$ **11.** _____

12. $\frac{1}{5}+\frac{1}{3}+\frac{1}{10}$ **12.** _____

13. Subtract: $10\frac{5}{6}-2\frac{7}{9}$ **13.** _____

14. Multiply: $1\frac{3}{8}\times 2\frac{3}{5}$ **14.** _____

15. Divide: $\frac{5}{7}\div 2\frac{3}{4}$ **15.** _____

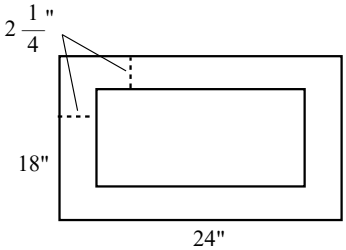
16. What is the LCD of $\frac{9}{14}$ and $\frac{5}{21}$? **16.** _____

17. A rectangular kennel measures $26\frac{1}{2}$ feet by $20\frac{1}{4}$ feet. Find the area of the kennel in square feet. **17.** _____

18. How many $\frac{3}{5}$-ounce packages of spices can be prepared from 75 ounces of the spices? **18.** _____

19. Christy bought a large bag of candy. She gave $\frac{1}{5}$ of it to her brother, $\frac{2}{3}$ to her mother, and took the rest home. What part of the bag did she take home? **19.** _____

20. A frame that is 18 inches by 24 inches has a mat in it that is $2\frac{1}{4}$ inches all around. What are the dimensions of the picture within the mat? **20.** _____



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Chapters 1–2 Cumulative Test Form B

Name:_____

Date:_____

1. Add: $\begin{array}{r} 4216 \\ 3191 \\ +\ 578 \\ \hline \end{array}$ **a.** 7915 **b.** 7985 **c.** 7965 **d.** 7875

2. Subtract: $\begin{array}{r} 2318 \\ -\ 1499 \\ \hline \end{array}$ **a.** 819 **b.** 1181 **c.** 881 **d.** 829

3. Multiply: $2 \times 3 \times 5 \times 9$ **a.** 275 **b.** 225 **c.** 360 **d.** 270

4. Divide: $8\overline{)60,328}$ **a.** 52,541 **b.** 7541 **c.** 8893 **d.** 8041

5. Write in exponent form: $5 \times 5 \times 5 \times 5$

a. 5^2 **b.** 5×4 **c.** 5^4 **d.** 4^5

6. Round to the nearest thousand: 35,709

a. 35,700 **b.** 35,000 **c.** 36,000 **d.** 35,710

7. Perform each operation in the proper order: $5^2 - 2 \times 10 + 3^2 \times 2 - 20 \div 4$

a. 87 **b.** 18 **c.** 114 **d.** 529

8. Professor Ranjan corrected some final exams, and it took him $5\frac{1}{4}$ hours. His teaching assistant corrected the rest of the exams, and it took her $8\frac{5}{6}$ hours. How many hours total did it take to correct all the exams?

a. $14\frac{1}{12}$ hours **b.** $14\frac{3}{5}$ hours **c.** $13\frac{3}{5}$ hours **d.** $13\frac{3}{10}$ hours

9. David ran the Boston Marathon, 26 miles, in $3\frac{1}{2}$ hours. What was his average rate of speed?

a. $7\frac{1}{2}$ miles per hour **b.** $7\frac{4}{7}$ miles per hour **c.** $7\frac{3}{8}$ miles per hour **d.** $7\frac{3}{7}$ miles per hour

10. Michael is a math tutor who charges $25 per hour. Last month he made $1075 tutoring. How many total hours did he work as a tutor?

a. 53 hours **b.** 403 hours **c.** 45 hours **d.** 43 hours

11. Simplify: $\frac{822}{56}$ **a.** $\frac{28}{56}$ **b.** $\frac{411}{28}$ **c.** $\frac{411}{56}$ **d.** $\frac{411}{14}$

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Chapters 1–2 Cumulative Test Form B *(cont.)*

Name:_____

12. Add: $\frac{1}{3}+\frac{2}{7}$ **a.** $\frac{3}{10}$ **b.** $\frac{6}{8}$ **c.** $\frac{13}{21}$ **d.** $\frac{2}{21}$

13. Subtract: $16\frac{1}{8}-5\frac{3}{4}$ **a.** $10\frac{3}{8}$ **b.** $11\frac{1}{2}$ **c.** $3\frac{1}{4}$ **d.** $12\frac{1}{8}$

14. Multiply: $\frac{5}{12}\times 2\frac{2}{3}$ **a.** $1\frac{1}{9}$ **b.** $2\frac{5}{9}$ **c.** $\frac{5}{9}$ **d.** $2\frac{1}{9}$

15. Divide: $2\frac{1}{7}\div 3\frac{1}{4}$ **a.** $6\frac{27}{28}$ **b.** $\frac{60}{91}$ **c.** $1\frac{2}{5}$ **d.** $\frac{2}{3}$

16. What is the least common denominator of $\frac{17}{50}$ and $\frac{4}{15}$?

a. 50 **b.** 5 **c.** 150 **d.** 750

17. A rectangular garden measures $4\frac{7}{8}$ yards by $9\frac{1}{4}$ yards. Find the area of the garden in square yards.

a. $5\frac{7}{8}$ sq. yds. **b.** $36\frac{7}{32}$ sq. yds. **c.** $45\frac{3}{32}$ sq. yds. **d.** $8\frac{5}{8}$ sq. yds.

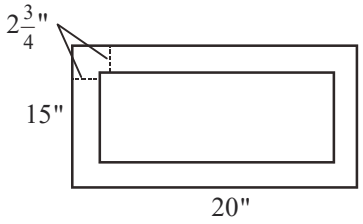
18. How many $\frac{3}{4}$-pound packages of meat can be prepared from 60 pounds of meat?

a. 80 packages **b.** 45 packages **c.** 60 packages **d.** 50 packages

19. Martha bought a bolt of fabric. She gave $\frac{1}{3}$ of it to her daughter and $\frac{2}{5}$ of it to her neighbor. What portion of the bolt did she have left?

a. $\frac{13}{15}$ bolt **b.** $\frac{2}{5}$ bolt **c.** $\frac{12}{15}$ bolt **d.** $\frac{4}{15}$ bolt

20. A picture frame is 15 inches by 20 inches. A mat that is $2\frac{3}{4}$ inches wide all around is used to enclose a painting. What are the dimensions of the painting within the mat?



a. $12\frac{1}{4}''$ by $17\frac{1}{4}''$ **b.** $9\frac{1}{2}''$ by $14\frac{1}{2}''$ **c.** $17\frac{3}{4}''$ by $22\frac{3}{4}''$ **d.** $11\frac{1}{4}''$ by $15\frac{1}{4}''$

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Chapter 3 Pretest Form A

Name:_____

Date:_____

1. Write a name for the decimal: 32.925 **1.** _____

2. Express as a decimal: $\frac{437}{10,000}$ **2.** _____

3. Write 8.13 as a mixed number in reduced form. **3.** _____

4. Write 0.625 as a fraction in reduced form. **4.** _____

5. Place the set of numbers in the proper order from smallest to largest: 3.5, 3.49, 3.51, 3.501 **5.** _____

6. Round 723.7612to the nearest tenth. **6.** _____

7. Round 41.30753 to the nearest thousandth. **7.** _____

8. Add: **8.** _____

$$\begin{array}{r} 6.31 \\ 5.9 \\ 9.04 \\ +\ 7.4 \\ \hline \end{array}$$

9. Add: $65.102 + 0.532 + 9.38$ **9.** _____

10. Subtract: **10.** _____

$$\begin{array}{r} 39.17 \\ -12.69 \\ \hline \end{array}$$

11. Subtract: $89 - 23.417$ **11.** _____

12. Multiply: **12.** _____

$$\begin{array}{r} 22.13 \\ \times\ 0.004 \\ \hline \end{array}$$

13. Multiply: 5.8703×1000 **13.** _____

14. Multiply: 0.0007293×10^4 **14.** _____

15. Divide: $0.03\overline{)0.04167}$ **15.** _____

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Mini-Lecture 1.1

Understanding Whole Numbers

Learning Objectives:

1. Write numbers in expanded form and in standard notation.
2. Write whole numbers in standard notation.
3. Write a word name for a number and write a number for a word name.
4. Read numbers in tables.
5. Key vocabulary: *whole numbers, decimal system, digits, period, scientific notation.*

Examples:

1. Write each number in expanded notation.
   a) 8516 b) 244,306 c) 77,079,101 d) 845,333,129

   Write each number in standard notation.
   e) 400 + 30 + 2 f) 60,000 + 4,000 + 300 + 20 + 9 g) 500,000 + 40 + 1
2. Identify the place value of each digit in the numbers.
   a) 3,654 b) 265,812 c) 56,203,411
3. Write a word name for each number.
   a) 325 b) 60,448 c) 9,542,006

   Write a number for each word name.
   d) two hundred fifty-three
   e) seven thousand, ninety-eight
   f) three hundred forty million, one hundred thirty-two
4. Use the following table to answer the questions.

Number of Spectators (in 1000s) During Regular Season

	2002	2004	2006
Major League Baseball	67,859	73,023	76,043
NCAA Basketball	38,928	40,777	40,843
National Hockey League	20,615	20,356	20,854

   a) How many spectators did Major League Baseball have during the 2006 season?
   b) During which year did the National Hockey League have the fewest spectators?
   c) How many spectators did NCAA Basketball have in 2002?

Teaching Notes:

- Students who do not have English as their first language might need extra help learning the number period vocabulary such as ones, thousands, millions, billions, etc. Refer them to the ***Place-value Chart*** in the textbook.
- Some students who do not have English as their first language are accustomed to using periods instead of commas as above.
- Be sure to remind students that *and* represents the decimal point when writing names of numbers and should not be used when writing names for whole numbers.
- In writing word names, use commas the same way you do when writing numbers (to separate periods).

Answers: 1a) 8000+500+10+6, b) 200,000+40,000+4000+300+6,c)70,000,000+7,000,000+70,000+9000+100+1, d) 800,000,000+40,000,000+5,000,000+300,000+30,000+3000+100+20+9, e) 432, f) 64,329, g) 500,041; 2a) 3-thousands,6-hundreds,5-tens,4-ones, b) 2-hundred thousands,6-ten thousands,5-thousands,8-hundreds,1-ten, 2-ones, c) 5-ten millions,6-millions,2-hundred thousands,3-thousands,4-hundreds, 1-tens,1-ones; 3a) three hundred twenty-five, b) sixty thousand, four hundred forty-eight, c) nine million, five hundred forty-two thousand, six, d) 253, e) 7,098, f) 340,000,132; 4a) 76,043,000, b) 2004, c) 38,928,000

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Mini-Lecture 1.2

Adding Whole Numbers

Learning Objectives:

1. Master basic addition facts.
2. Add several single digit numbers.
3. Add several-digit numbers when carrying is not needed.
4. Add several-digit numbers when carrying is needed.
5. Review the properties of addition.
6. Apply addition to real-life situations.
7. Key vocabulary: *addends, sum, identity property of zero, commutative property of addition, associative property of addition*.

Examples:

1. Add.
   a) $5+3$ b) $4+7$ c) $8+9$ d) $6+2$ e) $3+3$

2. Add.
   a) $6+4+3+7$ b) $8+8+0+5$ c) $3+9+5+7+6$

3. Add with no carrying required.

   a)
   $$\begin{array}{r} 53 \\ +\ 12 \\ \hline \end{array}$$

   b)
   $$\begin{array}{r} 1123 \\ +\ 345 \\ \hline \end{array}$$

   c)
   $$\begin{array}{r} 40{,}001 \\ 32{,}442 \\ +\ 15{,}333 \\ \hline \end{array}$$

   d)
   $$\begin{array}{r} 1{,}362{,}811 \\ +\ 4{,}537{,}026 \\ \hline \end{array}$$

4. Add with carrying required.

   a)
   $$\begin{array}{r} 96 \\ +\ 47 \\ \hline \end{array}$$

   b)
   $$\begin{array}{r} 5678 \\ +\ 3574 \\ \hline \end{array}$$

   c)
   $$\begin{array}{r} 6505 \\ 173 \\ 7044 \\ +\ 168 \\ \hline \end{array}$$

   d)
   $$\begin{array}{r} 5{,}935{,}734 \\ 3{,}002{,}167 \\ +\ 8{,}475{,}279 \\ \hline \end{array}$$

5. Add, then check by reversing the order.

   a)
   $$\begin{array}{r} 305 \\ 18 \\ 231 \\ +\ 654 \\ \hline \end{array}$$

   b)
   $$\begin{array}{r} 893 \\ 27 \\ 5 \\ 62 \\ +\ 136 \\ \hline \end{array}$$

6. a) Angie went shopping for her son's graduation party. She spent $375 on food, $187 on paper goods, and $172 on decorations. What is the total amount she spent on the party?

   b) A quality control inspector checks batches of plasma televisions for defects. In October, 12,317 televisions passed inspection and 37 were defective. In November, 14,592 televisions passed inspection and 128 were defective. In December, 13,744 televisions passed inspection and 95 were defective. How many televisions passed inspection during the three month period? How many were inspected?

Teaching Notes:

- Some students need to practice basic addition facts at home in order to master them. The use of flash cards to review addition facts can be helpful.
- Some students need to write the carry digit in order to get the right answer for addition with carrying.
- Remind students to add from right to left.
- Remind students to check their work by adding in the reverse order.

Answers: 1a) 8, b) 11, c) 17, d) 8, e) 6; 2a) 20, b) 21, c) 30; 3a) 65, b) 1468, c) 87,776, d) 5,899,837; 4a) 143, b) 9252, c) 13,890, d) 17,413,180; 5a) 1208, b) 1123; 6a) $734, b) 40,653; 40,913

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Mini-Lecture 1.3

Subtracting Whole Numbers

Learning Objectives:

1. Master basic subtraction facts.
2. Subtract whole numbers when borrowing is not necessary.
3. Subtract whole numbers when borrowing is necessary.
4. Check the answer to a subtraction problem.
5. Apply subtraction to real-life situations.
6. Key vocabulary: *difference, subtrahend, minuend, borrowing*.

Examples:

1. Subtract.

   a) $9 - 3$ b) $6 - 2$ c) $8 - 7$ d) $7 - 4$ e) $5 - 5$

2. Subtract. Check your answer by adding.

   a) $98 - 51$ b) $54 - 22$

   c)
   $$\begin{array}{r} 664 \\ -\ 51 \\ \hline \end{array}$$

   d)
   $$\begin{array}{r} 847 \\ -\ 325 \\ \hline \end{array}$$

   e)
   $$\begin{array}{r} 391{,}576 \\ -\ 20{,}373 \\ \hline \end{array}$$

3. Subtract. Use borrowing if necessary.

   a)
   $$\begin{array}{r} 51 \\ -\ 12 \\ \hline \end{array}$$

   b)
   $$\begin{array}{r} 1123 \\ -\ 345 \\ \hline \end{array}$$

   c)
   $$\begin{array}{r} 528 \\ -\ 316 \\ \hline \end{array}$$

   d)
   $$\begin{array}{r} 40{,}001 \\ -\ 15{,}333 \\ \hline \end{array}$$

4. Check each subtraction. If the problem has not been done correctly, find the correct answer.

   a)
   $$\begin{array}{r} 279 \\ -\ 54 \\ \hline 214 \end{array}$$

   b)
   $$\begin{array}{r} 4398 \\ -\ 1263 \\ \hline 3135 \end{array}$$

   c)
   $$\begin{array}{r} 71{,}193 \\ -\ 20{,}152 \\ \hline 51{,}142 \end{array}$$

5. a) Earl has $729 in his checking account. After he writes a check to the bookstore for $249, how much is remaining in his account?

   b) In 2008, the average attendance at LA Galaxy soccer games was 24,923. In the same year, the average attendance at Kansas City Wizards soccer games was 9,209. On average, how many more people attended LA Galaxy games than Kansas City Wizards games?

Teaching Notes:

- Some students need to practice basic subtraction facts at home in order to master them. The use of flash cards can help increase the level of mastery.
- Most students find subtraction without borrowing easy.
- Many students need to write the borrowing step in order to get the right answer for subtraction with borrowing.
- Some students have a lot of trouble using borrowing when zeros are involved.

Answers: 1a) 6, b) 4, c) 1, d) 3, e) 0; 2a) 47, b) 32, c) 613, d) 522, e) 371,203; 3a) 39, b) 778, c) 212, d) 24,668; 4a) Incorrect,225, b) Correct, c) Incorrect, 51,041; 5a) $480, b) 15,714

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Mini-Lecture 1.4

Multiplying Whole Numbers

Learning Objectives:

1. Master basic multiplication facts.
2. Multiply a single-digit number by a several-digit number.
3. Multiply a whole number by a power of 10.
4. Multiply a several-digit number by a several-digit number.
5. Use the properties of multiplication to perform calculations.
6. Apply multiplication to real-life situations.
7. Key vocabulary: *multiplication, factors, product, multiplication property of zero, identity property of 1, commutative property of multiplication, power of 10, partial products, associative property of multiplication, distributive property*

Examples:

1. Multiply.

   a) 3×2 b) $(4)(5)$ c) $9 \cdot 0$ d) $8(9)$ e) 4×1

2. Multiply.

   a) 51×2 b) 1123×5 c) $40{,}001 \times 3$ d) $21{,}483 \times 6$

3. Multiply by powers of 10.

   a) 213×10 b) 213×100 c) 213×1000 d) $213 \times 10{,}000$

   e) From the pattern you've observed, what would $754 \times 100{,}000$ equal?

4. Multiply.

   a) 18×22 b) 534×54 c) $4{,}302 \times 107$ d) 160×200 e) 735×428

5. Multiply. Take advantage of special products.

   a) $4 \times 2 \times 5$ b) $4 \times 7 \times 25$ c) $8 \times 20 \times 5 \times 3$

6. a) Jenny pays $275 per month for her car payment. How much does she pay per year?

   b) Frank bought 8 CDs at $15 each. How much did he pay total?

Teaching Notes:

- Some students need to practice basic multiplication facts at home in order to master them. As with addition and subtraction, the use of flashcards can be helpful.
- Some students do not know the different types of symbols that mean multiply. Be sure to give examples of the different symbols.
- Encourage students to include 0's as place holders when writing partial products.
- Encourage students to use the commutative and associative properties to make computations easier.

Answers: 1a) 6, b) 20, c) 0, d) 72, e) 4; 2a) 102, b) 5615, c) 120,003, d) 128,898; 3a) 2130, b) 21,300, c) 213,000, d) 2,130,000, e) 75,400,000; 4a) 396, b) 28,836, c) 460,314, d) 32,000, e) 314,580; 5a)40, b) 700, c) 2400; 6a) $3300, b) $120

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Mini-Lecture 1.5

Dividing Whole Numbers

Learning Objectives:

1. Master basic division facts.
2. Perform division by a one-digit number.
3. Perform division by a two- or three-digit number.
4. Apply division to real-life situations.
5. Key vocabulary: *related sentences, division, divisor, dividend, quotient, undefined,*

Examples:

1. Divide.
   a) $6 \div 2$ b) $7\overline{)49}$ c) $9 \div 0$

   d) $7 \div 7$ e) $8\overline{)56}$ f) $3 \div 1$

2. Divide. If needed, show remainder with R next to quotient.
   a) $9\overline{)189}$ b) $6\overline{)324}$ c) $5\overline{)4255}$

   d) $6\overline{)51}$ e) $4\overline{)1290}$ f) $8\overline{)36,524}$

3. Divide. If needed, show remainder with R next to quotient.
   a) $61\overline{)488}$ b) $23\overline{)2272}$ c) $13\overline{)9360}$

   d) $8293 \div 207$ e) $519\overline{)72,466}$

4. Solve the application problems.
   a) A telethon raises $4,903,800 over 20 hours. What was the average amount of money raised per hour?

   b) A luncheon for 36 guests cost $207. What was the cost per guest?

   c) Payton plays goalie on her soccer team. During one season, she stopped 136 shots over 8 games. How many shots per game did she stop?

Teaching Notes:

- Some students need to practice division facts at home in order to master them. Once again, flashcards can be helpful in reinforcing basic division facts.
- Many students do not know that division by zero is "undefined" and that zero divided by any non-zero number results in zero.
- Some students do not know how to check a division answer if there is a remainder and must be shown several examples.
- Encourage students to write out all their steps until they are comfortable doing operations mentally.

Answers: 1a) 3, b) 7, c) undefined, d) 1, e) 7, f) 3; 2a) 21, b) 54, c) 851, d) 8R3, e) 322R2, f) 4565R4; 3a) 8, b) 98R18, c) 720, d) 40R13, e) 139R325; 4a) $245,190, b) $5.75, c) 17

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Mini-Lecture 1.6

Exponents and the Order of Operations

Learning Objectives:

1. Evaluate expressions with whole-number exponents.
2. Perform several arithmetic operations in the proper order.
3. Key vocabulary: *exponent, base, evaluate, order of operations*.

Examples:

1. Write each number in exponent form.
   a) $4\times4\times4$ b) $2\times2\times2\times2$ c) $1\times1\times1\times1\times1$ d) 8

2. Evaluate the expressions.
   a) 3^2 b) 2^3 c) 4^4 d) 10^3
   e) 7^1 f) 9^0 g) 11^0+4^3 h) 7^3+2^3

3. Evaluate using the correct order of operations.
   a) $5\times7-6$ b) $8\times3^2-6\div2$
   c) $5\times(4-3)+5^2$ d) $15\div3\times8\times9\div(12-2^3)$
   e) $2^2+3^2+1^2$ f) $112-4\times8\times2\times0$
   g) $50\div25\times5-8+3\times(17-11)$ h) $(20)(5)-10(36\div9)$

Teaching Notes:

- Students who have never seen exponents before often write the exponent right next to the base, and same-sized, instead of to the upper right and smaller.
- Many students have trouble remembering order of operations. Encourage a lot of practice problems to reinforce their learning.
- Memory aids, such as Please Excuse My Dear Aunt Sally, can be helpful, but remind students that multiplication and division are done in the same step, as are addition and subtraction.
- Refer students to the ***Order of Operations*** charts in the textbook.
- If using a calculator to check answers, remind students that calculators adhere to order of operations strictly and are not mind readers. That is, calculators only know what the student entered, not what they meant to enter. Encourage the use of grouping symbols to help control the order of operations.

Answers: 1a) 4^3, b) 2^4, c) 1^5, d) 8^1; 2a) 9, b) 8, c) 256, d) 1000, e) 7, f) 1, g) 65, h) 351; 3a) 29, b) 69, c) 30, d) 90, e) 14, f) 112, g) 20, h) 60

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Mini-Lecture 1.7

Rounding and Estimating

Learning Objectives:

1. Round whole numbers.
2. Estimate an answer to a problem involving whole numbers.
3. Key vocabulary: *rounding up, rounding down, estimate, approximately equal to (≈).*

Examples:

1. Round to the nearest ten.
   a) 212
   b) 3,487
   c) 14
   d) 15,861

   Round to the nearest hundred.
   e) 312
   f) 1,267
   g) 83
   h) 14,961

   Round to the nearest thousand.
   i) 3,549
   j) 677
   k) 27,217
   l) 1,171

2. Use the principle of estimation (round to one non-zero digit) to find an estimate for each calculation.
   a) $57 + 24 + 88 + 71$
   b) $975{,}922 - 493{,}438$
   c) 867×72
   d) $384{,}119 \times 193$
   e) $52 \div 11$
   f) $4{,}357 \div 213$

3. In 2006, there were 253,793 individuals employed in the cellular telecommunications industry in the United States. Round this number to the nearest thousand.

4. Use the principle of estimation to estimate the desired quantity, then find the exact value.
   a) A local pizzeria makes 277 pizzas on an average day. Estimate how many pizzas are made in one year.

   b) In 2005, there were 66,753 wildfires in the U.S. In the following year there were 96,385 wildfires. Estimate the increase in wildfires from 2005 to 2006.

Teaching Notes:

- Some students are unfamiliar with rounding and will need to be repeatedly reminded to look at the digit to the right of the rounding position.
- A common mistake students make is to leave the digits to the right of the rounding position intact instead of changing them to zeros after rounding.
- Emphasize to students how estimating will be useful as a quick check in their future mathematics work.

Answers: 1a) 210, b) 3490, c) 10, d) 15,860, e) 300, f) 1300, g) 100, h) 15,000, i) 4000, j) 1000, k) 27,000, l) 1000; 2a) 240, b) 500,000, c) 63,000, d) 80,000,000, e) 5, f) 20; 3) 254,000, 4a) est. 120,000, exact 101,105, b) est. 29,000, exact 29,632

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Mini-Lecture 1.8

Solving Applied Problems Involving Whole Numbers

Learning Objectives:

1. Use the Mathematics Blueprint to solve problems involving one operation.
2. Use the Mathematics Blueprint to solve problems involving more than one operation.
3. Key vocabulary: *Mathematics Blueprint for Problem Solving*

Examples:

1. Solve problems involving one type of operation.
   a) Students at a party ordered 8 large pizzas. Each pizza is cut into 6 slices. How many slices are there in all?

   b) If a new amusement park covers 54 acres and there are 44,010 square feet in 1 acre, how many square feet of land does the amusement park cover?

   c) The town of Chelmsford, Massachusetts, has a population of 33,800. The town of Bedford, Massachusetts, has a population of 12,884. What is the difference in population between these two towns?

2. Solve problems involving more than one type of operation.
   a) Lisette bought six beach towels for $15 each, eight bottles of sunscreen for $5 each, and 2 pairs of sunglasses for $23 each. How much did she spend in all?

   b) Justin had a balance of $15 in his checking account. He made deposits of $784, $556, $413, and $50. He wrote out checks for $551, $347, $12, and $81. When all the deposits are recorded and all the checks clear, what balance will he have in his checking account?

   c) Egbichi wants to determine the miles-per-gallon rating of her Ford Mustang. She filled the tank when the odometer read 38,861 miles. After ten days, the odometer read 39,437 miles and the tank required 18 gallons to be filled. How many miles per gallon did Egbichi's car achieve?

   d) A tanning salon offers a monthly plan for $35, a yearly plan for $199, and a super yearly plan for $499. During January, the store sold 27 monthly plans, 15 yearly plans, and 4 super yearly plans. How much did the store earn in plan sales during January?

Teaching Notes:

- Many students struggle with application problems. Remind them that mathematics is much like a foreign language and requires a lot of practice to master. Work through several examples slowly, asking students to provide each step as you go.
- Refer students to the ***Mathematics Blueprint For Problem Solving*** in the textbook.
- Encourage students to use estimation to check whether their application problem answers are reasonable.

Answers: 1a) 48 slices, b) 2,376,540 sq ft, c) 20,916 people; 2a) $176, b) $827, c) 32 mi/gal, d) $5,926

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Mini-Lecture 2.1

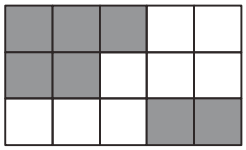
Understanding Fractions

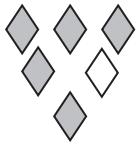
Learning Objectives:

1. Use a fraction to represent part of a whole.
2. Draw a sketch to illustrate a fraction.
3. Use fractions to represent real-life situations.
4. Key vocabulary: *fractions, numerator, denominator*

Examples:

1. Use a fraction to represent the shaded part of the object or objects.

   a) 

   b) 

   c) 

2. Draw a sketch to illustrate the fractional part.

   a) $\frac{4}{7}$ of an object

   b) $\frac{3}{4}$ of an object

3. Use a fraction to describe each situation.

   a) Ryan drove 43 minutes to go to a Cardinals baseball game. He spent 17 minutes of his trip in bumper-to-bumper traffic. What fractional part of his time was spent in bumper-to-bumper traffic?

   b) While target practicing, Clayton hit the bull's eye 7 times out of 10 attempts. What fraction of attempts did Clayton hit the bull's eye?

   c) Of 27 students in an algebra class, 19 of them are female. What fraction of the class is female?

Teaching Notes:

- Remind students that the denominator tells us how many parts make up the whole, while the numerator tells us how many of those parts are of interest.
- Some students forget which part of the fraction is the numerator and which is the denominator. An easy way for them to remember which is which is that the ***d***enominator is ***d***own at the bottom.
- Emphasize to students the difference between fractions of the form $\frac{0}{5}=0$ and $\frac{5}{0}$, which is undefined.

Answers: 1a) $\frac{7}{15}$, *b)* $\frac{5}{6}$, *c)* $\frac{2}{3}$; *2a)*  2b)  3a) $\frac{17}{43}$, *b)* $\frac{7}{10}$, *c)* $\frac{19}{27}$

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Mini-Lecture 2.2

Simplifying Fractions

Learning Objectives:

1. Write a number as a product of prime factors.
2. Reduce a fraction to lowest terms.
3. Determine whether two fractions are equal.
4. Key vocabulary: *prime number, composite number, prime factorization, equivalent fractions, simplest form, common factor, simplified, reduced, lowest terms, equality test for fractions*

Examples:

1. Write each number as a product of prime factors.

   a) 6 b) 20 c) 30 d) 84

   e) 29 f) 256 g) 900 h) 91

2. Simplify each fraction by dividing the numerator and denominator by the largest common factor.

   a) $\frac{5}{10}$ b) $\frac{16}{64}$ c) $\frac{42}{77}$ d) $\frac{88}{90}$

   Simplify each fraction by the method of prime factors.

   e) $\frac{4}{16}$ f) $\frac{15}{35}$ g) $\frac{27}{72}$ h) $\frac{66}{77}$

3. Determine whether the fractions are equal.

   a) $\frac{1}{3} \stackrel{?}{=} \frac{2}{6}$ b) $\frac{21}{33} \stackrel{?}{=} \frac{7}{13}$ c) $\frac{4}{10} \stackrel{?}{=} \frac{24}{60}$ d) $\frac{18}{54} \stackrel{?}{=} \frac{24}{48}$

Teaching Notes:

- A common mistake in prime factorization is to not factor completely.
  For example: $60 = 4 \times 3 \times 5$ or $2^2 \times 15$, instead of $2^2 \times 3 \times 5$
- Prime factorization is an important skill for finding least common denominators later in this chapter.
- Many students prefer the common factor method for reducing fractions.
- Refer students to the ***Divisibility Tests*** chart in the textbook.

Answers: 1a) 2×3, b) $2^2 \times 5$, c) $2 \times 3 \times 5$, d) $2^2 \times 3 \times 7$, e) prime, f) 2^8, g) $2^2 \times 3^2 \times 5^2$, h) 7×13; 2a) $\frac{1}{2}$, b) $\frac{1}{4}$, c) $\frac{6}{11}$, d) $\frac{44}{45}$, e) $\frac{1}{4}$, f) $\frac{3}{7}$, g) $\frac{3}{8}$, h) $\frac{6}{7}$; 3a) yes, b) no, c) yes, d) no

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Mini-Lecture 2.3

Converting Between Improper Fractions and Mixed Numbers

Learning Objectives:

1. Change a mixed number to an improper fraction.
2. Change an improper fraction to a mixed number.
3. Reduce a mixed number or an improper fraction to lowest terms.
4. Key vocabulary: *proper fraction, improper fraction, mixed number*

Examples:

1. Change each mixed number to an improper fraction.

   a) $2\frac{3}{4}$ b) $6\frac{2}{9}$ c) $1\frac{43}{58}$ d) $103\frac{4}{5}$

2. Write each improper fraction as a mixed number or a whole number.

   a) $\frac{8}{5}$ b) $\frac{81}{9}$ c) $\frac{48}{11}$ d) $\frac{196}{9}$

3. Reduce each mixed number.

   a) $3\frac{10}{15}$ b) $5\frac{32}{64}$

   Reduce each improper fraction.

   c) $\frac{27}{15}$ d) $\frac{143}{22}$

   Reduce each improper fraction by first changing to a mixed number.

   e) $\frac{370}{144}$ f) $\frac{567}{105}$

Teaching Notes:

- Students sometimes have a misconception that improper fractions are "wrong." Explain to the students that improper fractions are okay and that in many circumstances improper fractions may even be preferred over mixed numbers (such as in solving equations).
- Most students find the process for converting back and forth between mixed numbers and improper fractions easy. However, some may have difficulty multiplying and dividing correctly.
- Some students find reducing improper fractions and mixed numbers difficult.
- Some students periodically forget how to convert between improper fractions and mixed numbers, and vice-versa, and will need to be reminded in future sections.

Answers: 1a) $\frac{11}{4}$, b) $\frac{56}{9}$, c) $\frac{101}{58}$, d) $\frac{519}{5}$; 2a) $1\frac{3}{5}$, b) 9, c) $4\frac{4}{11}$, d) $21\frac{7}{9}$; 3a) $3\frac{2}{3}$, b) $5\frac{1}{2}$, c) $\frac{9}{5}$, d) $\frac{13}{2}$, e) $2\frac{41}{72}$, f) $5\frac{2}{5}$

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Mini-Lecture 2.4

Multiplying Fractions and Mixed Numbers

Learning Objectives:

1. Multiply two fractions that are proper or improper.
2. Multiply a whole number by a fraction.
3. Multiply mixed numbers.
4. Key vocabulary: *cancellation, simplest form*

Examples:

1. Multiply.

   a) $\frac{1}{2}\times\frac{3}{4}$ b) $\frac{5}{9}\times\frac{3}{15}$ c) $\frac{5}{6}\times\frac{9}{2}$

   Simplify first and then multiply.

   d) $\frac{3}{8}\times\frac{14}{15}$ e) $\frac{5}{24}\times\frac{36}{25}$ f) $\frac{270}{300}\times\frac{20}{9}$

2. Multiply.

   a) $7\times\frac{3}{5}$ b) $\frac{4}{9}\times 18$ c) $1\times\frac{18}{36}$ d) $\frac{4}{5}\times 25\times\frac{35}{16}$

   e) Jodi bought a car for \$25,500. After one year the car was worth $\frac{4}{5}$ of the original price. What was the car worth after one year?

3. Multiply.

   a) $3\frac{1}{2}\times 1\frac{1}{4}$ b) $2\frac{3}{4}\times\frac{8}{9}$ c) $6\times 8\frac{3}{4}\times\frac{1}{6}$ d) $7\frac{1}{2}\times 10\frac{2}{15}$

   e) Find the area of a rectangle with width $5\frac{3}{5}$ inches and length $9\frac{1}{2}$ inches.

   Solve each equation for x.

   f) $\frac{3}{4}\cdot x=\frac{21}{32}$ g) $x\cdot\frac{5}{6}=\frac{15}{54}$

Teaching Notes:

- Most students need to be shown how to turn a whole number into a fraction.
- Most students do better if they cancel before multiplying.
- Many students do not know that mixed numbers must be changed to improper fractions before multiplying. Some try to multiply the whole number parts together, and then multiply the fraction parts together.

Answers: 1a) $\frac{3}{8}$, b) $\frac{1}{9}$, c) $3\frac{3}{4}$, d) $\frac{7}{20}$, e) $\frac{3}{10}$, f) 2; 2a) $4\frac{1}{5}$, b) 8, c) $\frac{1}{2}$, d) $43\frac{3}{4}$, e) \$20,400; 3a) $4\frac{3}{8}$, b) $2\frac{4}{9}$, c) $8\frac{3}{4}$, d) 76, e) $53\frac{1}{5}$ square inches, f) $\frac{7}{8}$, g) $\frac{1}{3}$

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Mini-Lecture 2.5

Dividing Fractions and Mixed Numbers

Learning Objectives:

1. Divide two proper or improper fractions.
2. Divide a whole number and a fraction.
3. Divide mixed numbers.
4. Key vocabulary: *invert, reciprocals*

Examples:

1. Divide.

   a) $\frac{1}{2} \div \frac{3}{4}$ b) $\frac{5}{9} \div \frac{3}{15}$ c) $\frac{5}{6} \div \frac{9}{2}$ d) $\frac{5}{24} \div \frac{36}{24}$

2. Divide, if possible.

   a) $7 \div \frac{3}{5}$ b) $\frac{4}{9} \div 6$ c) $\frac{13}{17} \div 1$ d) $1 \div \frac{7}{16}$

   e) $\frac{4}{9} \div 0$ f) $0 \div \frac{3}{10}$ g) $\frac{2}{\frac{18}{36}}$ h) $\frac{\frac{4}{5}}{28}$

3. Divide.

   a) $3\frac{1}{2} \div 1\frac{1}{6}$ b) $\frac{5}{3} \div 8\frac{3}{4}$ c) $\frac{12\frac{3}{4}}{2\frac{1}{9}}$ d) $\frac{7\frac{1}{2}}{1\frac{3}{4}}$

   Solve for x.

   e) $x \div \frac{2}{3} = \frac{9}{4}$ f) $x \div \frac{6}{5} = \frac{15}{54}$

   g) Irving drove his car to Worcester, a distance of 200 miles, in $4\frac{1}{6}$ hours. What was his average speed (in miles per hour)?

   h) A butcher has $23\frac{1}{2}$ pounds of ground beef that he wishes to make into hamburger patties that weigh $\frac{1}{4}$ pound each. How many quarter-pound patties can the butcher make?

Teaching Notes:

- Warn students that, when dividing fractions, they should not cancel until after they have changed the problem to a multiplication problem.
- Remind students that mixed numbers must be changed to improper fractions before multiplying or dividing.

Answers: 1a) $\frac{2}{3}$, b) $2\frac{7}{9}$, c) $\frac{5}{27}$, d) $\frac{5}{36}$; 2a) $11\frac{2}{3}$, b) $\frac{2}{27}$, c) $\frac{13}{17}$, d) $2\frac{2}{7}$, e) undefined, f) 0, g) 4, h) $\frac{1}{35}$; 3a) 3, b) $\frac{4}{21}$, c) $6\frac{3}{76}$, d) $4\frac{2}{7}$, e) $\frac{3}{2}$ or $1\frac{1}{2}$, f) $\frac{1}{3}$, g) 48 mph, h) 94 patties

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Mini-Lecture 2.6

The Least Common Denominator and Creating Equivalent Fractions

Learning Objectives:

1. Find the least common multiple (LCM) of two numbers.
2. Find the least common denominator (LCD) given two or three fractions.
3. Create equivalent fractions with a least common denominator.
4. Key vocabulary: *multiples, least common multiple (LCM), least common denominator (LCD), building fraction property*

Examples:

1. Find the LCM for each pair of numbers.
   a) 4 and 3 b) 6 and 15 c) 8 and 48 d) 24 and 36

2. Find the LCD for each group of fractions.
   a) $\frac{7}{9}, \frac{5}{6}$ b) $\frac{3}{15}, \frac{13}{20}$ c) $\frac{7}{12}, \frac{5}{18}$

   d) $\frac{1}{9}, \frac{5}{7}, \frac{14}{63}$ e) $\frac{7}{8}, \frac{9}{14}, \frac{11}{16}$ f) $\frac{1}{20}, \frac{13}{16}, \frac{3}{4}$

3. Build each fraction to an equivalent fraction with the specified LCD.
   a) $\frac{1}{4}$, LCD = 12 b) $\frac{5}{7}$, LCD = 49 c) $\frac{3}{8}$ and $\frac{5}{6}$, LCD = 24

   Find the LCD. Then, build the fractions to equivalent fractions with the LCD as the denominator.
   d) $\frac{1}{12}, \frac{5}{16}$ e) $\frac{13}{24}, \frac{7}{40}$ f) $\frac{5}{6}, \frac{11}{15}, \frac{3}{20}$

Teaching Notes:

- Many students prefer to find an LCD by listing the multiples until a common one appears.
- It is important for students to also use the prime factor method for finding the LCD because they will use this method for algebraic fractions in future courses.
- Many students forget to multiply the missing factor into the numerator (as in example 3).
- Refer students to the ***Three-Step Procedure for Finding the Least Common Denominator*** and the ***Building Fraction Property*** charts in the textbook.

Answers: 1a) 12, b) 30, c) 48, d) 72; 2a) 18, b) 60, c) 36, d) 63, e) 112, f) 80; 3a) $\frac{3}{12}$, *b)* $\frac{35}{49}$, *c)* $\frac{3}{8}=\frac{9}{24}, \frac{5}{6}=\frac{20}{24}$, *d) LCD = 48,* $\frac{1}{12}=\frac{4}{48}, \frac{5}{16}=\frac{15}{48}$, *e) LCD = 120,* $\frac{13}{24}=\frac{65}{120}, \frac{7}{40}=\frac{21}{120}$, *f) LCD = 60,* $\frac{5}{6}=\frac{50}{60}, \frac{11}{15}=\frac{44}{60}, \frac{3}{20}=\frac{9}{60}$

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Mini-Lecture 2.7

Adding and Subtracting Fractions

Learning Objectives:

1. Add and subtract fractions with a common denominator.
2. Add and subtract fractions with different denominators.
3. Key vocabulary: *common denominator*

Examples:

1. Add or subtract. Simplify all answers.

   a) $\frac{3}{8}+\frac{2}{8}$ b) $\frac{3}{14}+\frac{4}{14}$ c) $\frac{2}{3}-\frac{1}{3}$ d) $\frac{9}{15}-\frac{3}{15}$

2. Add or subtract. Simplify all answers.

   a) $\frac{2}{4}+\frac{1}{8}$ b) $\frac{5}{6}+\frac{7}{8}$ c) $\frac{7}{12}+\frac{9}{30}$ d) $\frac{2}{3}+\frac{2}{24}+\frac{1}{6}$

   e) $\frac{3}{4}-\frac{5}{8}$ f) $\frac{2}{3}-\frac{3}{16}$ g) $\frac{5}{6}-\frac{8}{12}$ h) $\frac{4}{5}-\frac{8}{10}$

   Solve for the unknown number. Simplify all answers.

   i) $x+\frac{1}{9}=\frac{5}{18}$ j) $x-\frac{3}{8}=\frac{3}{16}$ k) $x+\frac{4}{5}=\frac{9}{11}$

   l) Amanda started running on Monday. She ran $\frac{1}{3}$ mile. On Wednesday she ran $\frac{3}{4}$ mile. How many miles has she ran so far this week?

Teaching Notes:

- Remind students to always be sure to simplify final answers.
- Remind students that they cannot cross-cancel when adding or subtracting fractions, but only when multiplying fractions.
- Some students want to erroneously add or subtract the denominators instead of finding the LCD.
- Some students forget to multiply the numerator when building equivalent fractions.
- Consider working some of the problems from Example 2 by using both the LCD method and the method of using the product of the two denominators as a common denominator. This way, each student can determine the approach he or she prefers.

Answers: 1a) $\frac{5}{8}$, b) $\frac{1}{2}$, c) $\frac{1}{3}$, d) $\frac{2}{5}$; 2a) $\frac{5}{8}$, b) $1\frac{17}{24}$, c) $\frac{53}{60}$, d) $\frac{11}{12}$, e) $\frac{1}{8}$, f) $\frac{23}{48}$, g) $\frac{1}{6}$, h) 0, i) $\frac{1}{6}$, j) $\frac{9}{6}$, k) $\frac{1}{55}$, l) $1\frac{1}{12}$ mi

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Mini-Lecture 2.8

Adding and Subtracting Mixed Numbers and the Order of Operations

Learning Objectives:

1. Add mixed numbers.
2. Subtract mixed numbers.
3. Evaluate fractional expressions using the order of operations.
4. Key vocabulary: *order of operations*

Examples:

1. Add. Express the answer as a mixed or whole number. Simplify all answers.

   a) $8\frac{3}{10}+1\frac{1}{10}$ b) $8\frac{7}{15}+3\frac{3}{10}$ c) $14\frac{6}{7}+15\frac{1}{2}$ d) $11\frac{13}{20}+4\frac{3}{5}$

2. Subtract. Express the answer as a mixed or whole number. Simplify all answers.

   a) $12\frac{3}{8}-10\frac{1}{4}$ b) $5\frac{2}{5}-3\frac{1}{10}$ c) $12-4\frac{3}{8}$ d) $16\frac{2}{9}-10\frac{11}{12}$

   e) Jan walked $49\frac{1}{5}$ yards and Mark walked $21\frac{3}{10}$ yards. How much farther did Jan walk?

3. Evaluate using the correct order of operations.

   a) $\left(\frac{2}{3}\right)^2$ b) $\left(\frac{1}{2}\right)^2$ c) $\frac{4}{5}-\frac{1}{2}\times\frac{6}{5}$ d) $\frac{1}{4}\times\frac{3}{4}+\frac{3}{8}\div\frac{3}{4}$

   e) $\left(\frac{5}{6}-\frac{7}{12}\right)\times\frac{7}{9}$ f) $\frac{4}{3}\div\left(\frac{3}{5}-\frac{3}{10}\right)$ g) $\left(\frac{1}{3}\right)^2\times\frac{27}{30}$ h) $\left(\frac{2}{3}\right)^2\div\frac{5}{9}$

Teaching Notes:

- Many students have difficulty with this section.
- Some students like to see the following approach for borrowing: $11\frac{9}{20} \rightarrow {}^{10}\!\not{1}1\ 1\frac{9}{20} \rightarrow 10\frac{29}{20}$
- Some students make errors similar to the following: $\left(\frac{1}{2}\right)^2=\frac{2}{4}$
- Watch for students who confuse the multiplying and adding/subtracting processes by incorrectly finding common denominators when multiplying and/or cross canceling when adding/subtracting.

Answers: 1a) $9\frac{2}{5}$, b) $11\frac{23}{30}$, c) $30\frac{5}{14}$, d) $16\frac{1}{4}$; 2a) $2\frac{1}{8}$, b) $2\frac{3}{10}$, c) $7\frac{5}{8}$, d) $5\frac{11}{36}$, e) $27\frac{9}{10}$ yd; 3a) $\frac{4}{9}$, b) $\frac{1}{4}$, c) $\frac{1}{5}$, d) $\frac{11}{16}$, e) $\frac{7}{36}$, f) $4\frac{4}{9}$, g) $\frac{1}{10}$, h) $\frac{4}{5}$

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Mini-Lecture 2.9

Solving Applied Problems Involving Fractions

Learning Objectives:

1. Solve real-life problems with fractions.
2. Key vocabulary: *estimation*

Examples:

1. Solve each problem.
   a) A dump truck delivered $12\frac{5}{8}$ tons of gravel to a construction worksite. A second dump truck delivered $10\frac{7}{12}$ tons of gravel to the same worksite. What is the total weight of gravel that was delivered to the worksite by the two dump trucks?

   b) An obstetrician delivered a baby girl weighing $9\frac{3}{16}$ pounds. Fifteen minutes later, the same obstetrician delivered a baby boy weighing $7\frac{1}{4}$ pounds. By how much did the baby girl outweigh the baby boy?

   c) Robert and Paul each took some chips from a bag of potato chips which contained $9\frac{1}{2}$ ounces of chips. Robert took $2\frac{1}{3}$ ounces of chips and Paul took $3\frac{5}{6}$ ounces of chips. How many ounces of chips were left in the bag?

   d) Find the perimeter of a square that measures $2\frac{9}{10}$ yards on each side.

   e) What is the area of a rectangular garden that is $11\frac{1}{2}$ yards long and $12\frac{1}{6}$ yards wide?

   f) Jody is using a recipe that calls for $\frac{1}{4}$ cup of milk per batch. If she has $5\frac{3}{4}$ cups of milk available, how many batches can she make?

Teaching Notes:

- Many students have difficulty with application problems. Encourage students to begin by working a similar but simpler problem (for example, one not involving fractions).
- Remind students to draw diagrams, when appropriate, to help determine the solution process.
- Refer students to the ***Mathematics Blueprint for Problem Solving*** chart in the textbook.
- Encourage students to estimate their answers as a way of checking the exact answers.

Answers: 1a) $23\frac{5}{24}$ tons, b) $1\frac{15}{16}$ lb, c) $3\frac{1}{3}$ oz, d) $11\frac{3}{5}$ yd, e) $139\frac{11}{12}$ yd^2, f) 23 batches

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Mini-Lecture 3.1

Using Decimal Notation

Learning Objectives:

1. Write a word name for a decimal fraction.
2. Change from fractional notation to decimal notation.
3. Change from decimal notation to fractional notation.
4. Key Vocabulary: *decimal fractions, fractional form, decimal form*

Examples:

1. Write a word name for each decimal.

   a) 0.35 b) 0.007

   c) 4.12 d) 32.1

2. Write a word name as you would on a check.

   a) $144.25 b) $34,256.09

3. Write in decimal notation.

   a) five tenths b) thirty three hundredths

   c) seven hundred sixty four thousandths d) six and eleven ten-thousandths

4. Write each fraction as a decimal.

   a) $\frac{6}{10}$ b) $\frac{73}{100}$ c) $\frac{105}{1000}$

   d) $\frac{3333}{10,000}$ e) $3\frac{9}{10}$ f) $142\frac{203}{1000}$

5. Write in fractional notation. Reduce whenever possible.

   a) 0.3 b) 0.8 c) 3.25 d) 122.004

6. Scientists testing a certain chew toy for dogs found the level of lead in the product to be roughly 336 parts per million. Write this amount as a fraction in the lowest terms.

Teaching Notes:

- Remind students that leading 0 in numbers like 0.37 is not required but does make the number easier to work with.
- Emphasize that students should be able to convert decimal and fraction forms to the alternate form equally well.
- Remind students that the word "and" is used to represent the decimal point, not the word "point".
- Refer students to the ***Decimal Place Values*** chart in text.

Answers: 1a) thirty-five hundredths, b) seven thousandths, c) four and twelve hundredths, d) thirty-two and one tenth, 2a) one hundred forty-four and 25/100 dollars, b) thirty-four thousand, two hundred fifty-six and 9/100 dollars; 3a) 0.5, b) 0.33, c) 0.764, d) 6.0011; 4a) 0.6, b) 0.73, c) 0.105, d) 0.3333, e) 3.9, f) 142.203; 4a) 3/10, b) 4/5, c) 3 1/4, d) 122 1/250, 6) 21/62,500

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Mini-Lecture 3.2

Comparing, Ordering, and Rounding Decimals

Learning Objectives:

1. Compare decimals.
2. Place decimals in order from smallest to largest.
3. Round decimals to a specified decimal place.
4. Key Vocabulary: *number line, inequality symbols*

Examples:

1. Fill in the blank with one of the symbols <, =, or >.

   a) 0.3 ___ 0.5

   b) 0.33 ___ 0.31

   c) 1.56 ___ 1.560

   d) 22.001 ___ 21.001

   e) $\frac{7}{10}$ ___ 0.7

   f) 0.006 ___ $\frac{6}{100}$

2. Arrange each set of decimals from smallest to largest.

   a) 0.415, 0.42, 0.409, 0.4102

   b) 23.082, 23.02, 23.088, 23.079

3. Round each number to the place indicated.

   a) 5.38 to the nearest tenth.

   b) 0.753 to the nearest tenth.

   c) 103.843 to the nearest hundredth.

   d) 7.385 to the nearest one.

   e) 19.1299 to the nearest thousandth.

   f) $5.247 to the nearest cent.

   g) $819.983 to the nearest cent.

   h) $5.247 to the nearest dollar.

   i) $819.983 to the nearest dollar.

Teaching Notes:

- Some students find a number line useful for Example 1.
- Some students think that the number with more decimal places is larger when comparing decimals.
- Most students find Examples 3a)-e) easy.
- Some students are confused by rounding money values to the nearest cent because the cent position is in the hundredths spot, but they think of the cent as being in the ones position (1 cent position) instead of in the one-hundredths-of-a-dollar position.

Answers: 1a) <, b) >, c) =, d) >, e) =, f) <; 2a) 0.409, 0.4102, 0.415, 0.42, b) 23.02, 23.079, 23.082, 23.088; 3a) 5.4, b) 0.8, c) 103.84, d) 7, e) 19.130, f)$5.25, g) $819.98, h) $5, i) $820

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Mini-Lecture 3.3

Adding and Subtracting Decimals

Learning Objectives:

1. Add decimals.
2. Subtract decimals.
3. Key Vocabulary: *decimals, decimal fractions*

Examples:

1. Add the following numbers.

   a) 56.3 + 12.2 b) 56.3 + 19.8 c) 1.665 + 9.888

   d) 1.84 + 20.749 e) 10 + 1.24 f) 1.2 + 0.337 + 6

   g)
   $$\begin{array}{r} 14. \\ 123.14 \\ +\quad 5.4 \\ \hline \end{array}$$

2. Subtract the following numbers.

   a) 48.7 – 42.3 b) 48.7 – 2.9 c) 30.44 – 16.3

   d) 7 – 4.1 e) 5.00725 – 1.06921 f)
   $$\begin{array}{r} 7238.24 \\ -\ 6125.08 \\ \hline \end{array}$$

3. Add or subtract as needed to solve the following application problems.

   a) Jasmine drove on a summer trip. When she began, the odometer read 32,046.22 miles. When she was done, the odometer read 32,731.19 miles. How many miles did she travel during her trip?

   b) Keith purchased some clothing at the mall. He bought a shirt for $28.99, a pair of jeans for $39.99, and a watch for $24.50. How much did he spend?

Teaching Notes:

- Most students find this section easy.
- Some students need to be shown how to add the extra zeros to the ends of the decimal parts of numbers, and where to place the decimal for whole numbers.
- Some students need to write in the borrowing steps in order to subtract without errors.
- Some students must be reminded of how to borrow across zeros when subtracting.

Answers: 1a) 68.5, b) 76.1, c) 11.553, d) 22.589, e) 11.24, f) 7.537, g) 142.54; 2a) 6.4, b) 45.8, c) 14.14, d) 2.9, e) 3.93804, f) 1113.16; 3a) 684.97 mi, b) $93.48

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Mini-Lecture 3.4

Multiplying Decimals

Learning Objectives:

1. Multiply a decimal by a decimal or a whole number.
2. Multiply a decimal by a power of 10.

Examples:

1. Multiply the following numbers.

   a) 2.2×6 b) 0.22×0.6 c) 22×0.6

   d) 0.581×2.9 e) 73.12×22.34 f) 0.6288×5003

2. Do the following multiplications, and notice the emerging pattern.

   a) 5.4×10 b) 0.33×10

   c) 5.4×100 d) 0.33×10^2

   e) 5.4×1000 f) 0.33×10^3

   g) From the pattern you've observed, what would 765.52×10^5 equal?

3. a) A retail store purchases 100 sweaters at $35.65 each. How much did the store pay for the order?

   b) A college is purchasing carpeting for a new student lounge. What is the price of a carpet that is 21.3 yards wide and 180.4 yards long if the cost is $11.25 per square yard?

Teaching Notes:

- Most students find Example 1 easy.
- Some students do not see the multiplying by powers of 10 pattern in Example 2 on their own, and must be shown.
- Some students are confused by the shortcut for multiplying by powers of 10 and prefer doing out the multiplication the long way.
- Show students how converting within metric units is easier than in US Customary units due to the use of powers of 10.

Answers: 1a) 13.2, b) 0.132, c) 13.2, d) 1.6849, e) 1633.5008, f) 3145.8864; 2a) 54, b) 3.3, c) 540, d) 33, e) 5400, f) 330, g) 76,552,000; 3a) $3565, b) $43,228.35

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Mini-Lecture 3.5

Dividing Decimals

Learning Objectives:

1. Divide a decimal by a whole number.
2. Divide a decimal by a decimal.
3. Key Vocabulary: *divisor, dividend, quotient, place holder, multiplication identity*

Examples:

1. Divide until there is a remainder of zero.

   a) $8\overline{)50.4}$ b) $32\overline{)20.16}$ c) $\frac{1.62}{6}$

2. Divide until there is a remainder of zero.

   a) $2.6\overline{)54.6}$ b) $0.8112 \div 0.06$ c) $168.3 \div 2.2$

3. Divide and round to the nearest hundredth.

   a) $20.9 \div 15$ b) $0.6\overline{)0.557}$ c) $4.399 \div 0.13$

   Divide and round to the nearest thousandth.

   d) $8.45 \div 71$ e) $0.3\overline{)79.46}$ f) $444.22 \div 0.13$

   Divide and round to the nearest whole number.

   g) $18\overline{)2250}$ h) $0.0031\overline{)0.8277}$

4. Mark owns a Ford Escort that travels 360 miles on 15.5 gallons of gas. How many miles per gallon does it achieve? (Round your answer to the nearest tenth.)

Teaching Notes:

- Most students find Example 1 easy.
- Most students do not know, or have forgotten, how to do the division in Example 2. But once they are shown how to move the decimals, most students find this type of division easy.
- Most students are unaware that the division in Example 3 must be carried to one place beyond the rounding position.
- Discuss the difference between 'rounding off' and 'rounding up' or 'rounding down'.
- Encourage the use of 'place holders' to aid in division.

Answers: 1a) 6.3, b) 0.63, c) 0.27; 2a) 21, b) 13.52, c) 76.5; 3a) 1.39, b) 0.93, c) 33.84, d) 0.119, e) 264.867, f) 3417.077, g) 125, h) 267; 4) 23.2 mpg

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Mini-Lecture 3.6

Converting Fractions to Decimals and the Order of Operations

Learning Objectives:

1. Convert a fraction to a decimal.
2. Use the correct order of operations with decimals.
3. Key Vocabulary: *terminating decimal, repeating decimal, order of operations*

Examples:

1. Write as an equivalent decimal. Divide until there is a remainder of zero or a repeating decimal.

   a) $\frac{1}{4}$ b) $\frac{2}{5}$ c) $\frac{2}{3}$ d) $4\frac{5}{6}$

2. Write as an equivalent decimal or decimal approximation. Round your answer to the nearest thousandth if needed.

   a) $\frac{2}{7}$ b) $5\frac{13}{27}$ c) $\frac{39}{23}$ d) $\frac{11}{19}$

3. Evaluate using the correct order of operations.

   a) $6.2 + (4.3)^2 - 9.72$ b) $2.25 + 1.06 \times 4.85$

   c) $2.25 - 1.06 \times (4.85 - 3.95)$ d) $25.1 + 11.4 \div 7.5 \times 3.75$

   e) $(0.2)^3 + (7 - 2.4) \times 5.5$ f) $4.9 \times 3.6 \times 2.1 - 0.1 \times 0.2 \times 0.3$

4. A hex bolt manufacturer makes $1\frac{1}{2}$-inch bolts with a minimum width across the corners of $2\frac{12}{25}$ inches and a maximum width across the corners of 2.598 inches. What is the difference between the maximum and minimum widths?

Teaching Notes:

- Many students need to be reminded of the order of operations.
- Some students perform $(4.3)^2$ as 4^2 point 3^2 the first time they see a problem such as 3a).
- Many students need to be reminded to work in a neat and organized manner in order to arrive at the correct answer.

Answers: 1a) 0.25, b) 0.4, c) $0.\overline{6}$, d) $4.8\overline{3}$; 2a) 0.286, b) 5.481, c) 1.696, d) 0.579; 3a) 14.97, b) 7.391, c) 1.296, d) 30.8, e) 25.308, f) 37.038; 4) 0.118 inch

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Mini-Lecture 3.7

Estimating and Solving Applied Problems Involving Decimals

Learning Objectives:

1. Estimate sums, differences, products, and quotients of decimals.
2. Solve applied problems using operations with decimals.
3. Key Vocabulary: *Mathematics Blueprint for Problem Solving*

Examples:

1. Round each number to one non-zero digit. Then estimate the result of the calculation.

   a) $2.3 + 6.7$

   b) $434.23 - 201.6$

   c) $457{,}223{,}102.44 + 113{,}244{,}541$

   d) 2.3×6.7

   e) 434.23×201.6

   f) $56{,}200 \div 3{,}000.23$

2. Solve the following application problems. Round to the nearest hundredth if needed.

   a) At a fast food restaurant, Amanda bought a soda for $0.95, a medium French fry for $1.39, and a fish sandwich for $2.69. How much did Amanda pay for her meal?

   b) Carmine has $20 to spend on groceries. He spends $1.29 on lettuce, $0.89 on tomatoes, $1.00 on cucumbers, $3.29 on soda, $10.95 on meat, and $2.99 on ice cream. Did Carmine have enough money for this purchase?

   c) Juan and Anita are having their roof re-shingled and need to determine its area in square feet. The dimensions of the roof are 38.5 feet by 61.8 feet. What is the area of the roof in square feet?

   d) Three employees of Prime Real Estate are sharing a commission of $8,241.33. How much does each employee receive?

Teaching Notes:

- Most students find estimation easy once they are shown a method.
- Refer students to the ***Mathematics Blueprint for Problem Solving*** in the text.
- Students often struggle with application problems. Encourage them to use estimation to check whether their application problem answers are reasonable.

Answers: 1a) 9, b) 200, c) 600,000,000, d) 14, e) 80,000, f) 20; 2a) $5.03, b) no, c) 2379.3 sq ft, d) $2747.11

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Mini-Lecture 4.1

Ratios and Rates

Learning Objectives:

1. Use a ratio to compare two quantities with the same units.
2. Use a rate to compare two quantities with different units.
3. Key vocabulary: *ratio, simplest form, rate, unit rate.*

Examples:

1. Write the ratio in lowest terms. Express your answer as a fraction.

   a) 9 miles to 15 miles b) $12 to $38 c) $6\frac{1}{3}$ ounces to $9\frac{1}{2}$ ounces

   During a game of basketball, Ben shot the ball 25 times making 15 of them.
   d) Write the ratio of number of made shots to number of attempted shots.
   e) Write the ratio of number of made shots to number of missed shots.

   A couple went out for the evening and spent $38 on dinner and $24 at the movies.
   f) What is the ratio of dollars spent on movies to dollars spent on dinner?
   g) What is the ratio of dollars spent on dinner to the total amount spent for the evening?

2. Write each statement as a rate in simplest form.

   a) 5 cars for 20 people b) 408 miles on 16 gallons c) 82 hours for 18 projects

   Write each statement as a unit rate.
   d) 132 miles on 3 gallons of gas e) 1200 cars in 400 households
   f) 243 miles in 9 hours g) $950 earned in 5 weeks

   Solve the following problem using unit rates.
   h) A produce market purchased 500 pound of tomatoes for $725. The market then sold the 500 pounds of tomatoes for a total of $1295. How much profit did the produce market make per pound of tomatoes?
   i) One jar of jelly costs $2.32 for 16 ounces. Another jar costs $2.03 for 13 ounces. Which is the better buy?

Teaching Notes:

- Some students will forget to reduce the fractions here.
- Some students will wonder why improper fractions do not need to be changed to mixed numbers when working with ratios and rates.
- Many students need to be reminded of the division rule for fractions.
- Be sure to emphasize the difference between a ratio and a rate.

Answers: 1a) 3/5, b) 6/19, c) 2/3, d) 3/5, e) 3/2, f) 12/19, g) 19/31; 2a) 1 car/4 people, b) 51 miles/2 gallons, c) 41 hours/9 projects, d) 44 miles/gallon, e) 3 cars/household, f) 27 miles/hour, g) $190 /week, j) $1.14/pound, i) $2.32 for 16 oz

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Mini-Lecture 4.2

The Concept of Proportions

Learning Objectives:

1. Write a proportion.
2. Determine whether a statement is a proportion.
3. Key vocabulary: *proportion, cross product*.

Examples:

1. Write a proportion for each statement.

   a) 3 is to 5 as 6 is to 10 b) 6.5 is to 5 as 52 is to 40 c) $3\frac{1}{3}$ is to 4 as $4\frac{1}{6}$ is to 5

   d) Write the proportion to express the following: If three pounds of a fertilizer will cover 1275 square feet of yard, then 5 pounds of the fertilizer will cover 2125 square feet of yard.

2. Determine whether the equation is a proportion.

   a) $\frac{1}{2} \stackrel{?}{=} \frac{3}{6}$ b) $\frac{4}{10} \stackrel{?}{=} \frac{16}{39}$ c) $\frac{1}{2} \stackrel{?}{=} \frac{4.8}{9.6}$ d) $\frac{40}{39.2} \stackrel{?}{=} \frac{5}{5.3}$

   e) $\frac{2\frac{5}{9}}{5} \stackrel{?}{=} \frac{5\frac{1}{9}}{10}$ f) $\frac{8}{17} \stackrel{?}{=} \frac{4}{8\frac{1}{2}}$ g) $\frac{318 \text{ feet}}{4 \text{ rolls}} \stackrel{?}{=} \frac{954 \text{ feet}}{12 \text{ rolls}}$

   Solve each application problems. Answer yes or no, and provide a reason for your answer.

   h) A car traveled 578 miles in 8.5 hours. A truck traveled 272 miles in 4 hours. Did they travel at the same speed?

   i) Sharon earned gross pay of $793.80 working 42 hours each week in a web design agency. Jesse's gross weekly pay was $737.10 for a 39-hour work week with a different agency. Was Sharon's pay per hour the same as Jesse's pay per hour?

Teaching Notes:

- It is important to start with an easy proportion such as 1a) so that students see that proportions are merely equivalent fractions.
- Many students have trouble with proportions involving complex fractions.
- Remind students that, when writing their own proportions, they should be careful to place corresponding entries into corresponding positions in the proportion.
- Refer students to the ***Equality Test for Fractions*** chart in the textbook.

Answers: 1a) $\frac{3}{5} = \frac{6}{10}$, *b)* $\frac{6.5}{5} = \frac{52}{40}$, *c)* $\frac{3\frac{1}{3}}{4} = \frac{4\frac{1}{6}}{5}$, *d)* $\frac{3}{1275} = \frac{5}{2125}$; *2a) yes, b) no, c) yes, d) no, e) yes, f) yes, g) yes, h) yes, reasons vary, i) yes, reasons vary*

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Mini-Lecture 4.3

Solving Proportions

Learning Objectives:

1. Solve for the variable n in an equation of the form $a \times n = b$.
2. Find the missing number in a proportion.
3. Key vocabulary: *variable, equation, solve*.

Examples:

1. Solve for n.

   a) $5 \times n = 30$ b) $45 = n \times 5$ c) $n \times 7 = 34.3$

   d) $23.6 = 4 \times n$ e) $n \times \frac{1}{2} = 3$ f) $12 = \frac{4}{3} \times n$

2. Find the missing number in a proportion. Round to the nearest tenth, if needed.

   a) $\frac{x}{10} = \frac{8}{20}$ b) $\frac{3}{x} = \frac{9}{15}$ c) $\frac{1}{2} = \frac{x}{17}$ d) $\frac{2}{7} = \frac{3}{x}$

   e) $\frac{2}{x} = \frac{0.6}{1.2}$ f) $\frac{x}{6.8} = \frac{0.08}{5}$ g) $\frac{\frac{5}{2}}{9} = \frac{45}{x}$ h) $\frac{1}{5\frac{1}{2}} = \frac{x}{11}$

   Find the value of n. Round to the nearest hundredth when necessary.

   i) $\frac{n \text{ ounces}}{23 \text{ quarts}} = \frac{39.6 \text{ ounces}}{9 \text{ quarts}}$ j) $\frac{27 \text{ liters}}{n \text{ grams}} = \frac{4 \text{ liters}}{18.8 \text{ grams}}$

   k) $\frac{3 \text{ kilometers}}{1.86 \text{ miles}} = \frac{n \text{ kilometers}}{5 \text{ miles}}$ l) $\frac{2\frac{1}{5} \text{ feet}}{6 \text{ pounds}} = \frac{n \text{ feet}}{10 \text{ pounds}}$

Teaching Notes:

- Some students prefer to solve examples such as 2a) and 2b) by inspection using the concept of equivalent fractions.
- Feel free to use the notation $5n$ to indicate multiplication of a constant and a variable, rather than $5 \times n$, but be sure that students are aware of its meaning.
- Remind students that statements such as $n = 4$ and $4 = n$ are equivalent. Some students may prefer to have the variable on the left side of the equation.
- Refer students to the ***To Solve for a Missing Number in a Proportion*** chart in the textbook.

Answers: 1a) 6, b) 9, c) 4.9, d) 5.9, e) 6, f) 9; 2a) 4, b) 5, c) 8.5, d) 10.5, e) 4, f) 0.1, g) 2, h) 2, i) 101.2, j) 126.9, k) 8.06, l) 3.67

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Mini-Lecture 4.4

Solving Applied Problems Involving Proportions

Learning Objectives:

1. Solve applied problems using proportions.

Examples:

1. Solve each application.
   a) It takes Kim 22 minutes to type and spell check 14 pages of a manuscript. Find how long it takes her to type and spell check 77 pages. Round answer to the nearest whole number if needed.

   b) On an architect's blueprint, 1 inch corresponds to 12 feet. If an exterior wall is 44 feet long, find how long the blueprint measurement should be. Write the answer as a mixed number if needed.

   c) It is recommended that there be at least 11.2 square feet of ground space in a garden for every newly planted shrub. A garden is 25.6 feet by 21 feet. Find the maximum number of shrubs the garden can accommodate.

   d) The Department of Natural Resources (DNR) wants to determine the number of large mouth bass at least 12 inches in length that are living in a public lake. DNR agents capture, tag, and release 150 large mouth bass that are at least 12 inches long. Two months later in the same lake, the DNR agents capture 100 large mouth bass that are at least 12 inches long. Of these, 12 have tags from the previous capture. Approximately how many large mouth bass at least 12 inches in length are living in the lake?

   e) At a college in eastern Minnesota, 7 out of every 10 students worked either a full-time or part-time job in addition to their studies. If 4900 students were enrolled at the college, how many did not have a full-time or part-time job?

   f) Traveling in Europe, Paula exchanged 100 U.S. dollars for 64 Euros. A few days later, she exchanged 150 U.S. dollars for Euros and got the same exchange rate. How many Euros did Paula receive? Round to the nearest tenth.

Teaching Notes:

- Remind students that, when writing their own proportions, they should be careful to place corresponding entries into corresponding positions in the proportion. Be sure to show students how to line up the units and substitute "x" for the unknown value.
- Remind students to use estimation to see if their answers are reasonable.
- Refer students to the ***Mathematics Blueprint For Problem Solving*** chart in the textbook.

Answers: 1a) 121 minutes, b) 3 2/3 inches, c) 48 shrubs, d) 1250 bass, e) 1470 students, f) 96 Euros

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Name:_____

Additional Exercises 1.1 Form I

Date:_____

1. Write 47 in expanded form. **1.** _____

2. Write 150 in expanded form. **2.** _____

3. Write $500 + 20 + 9$ in standard notation. **3.** _____

4. Write $7000 + 400 + 80 + 1$ in standard notation. **4.** _____

5. For the number 132, which number is in the tens place? **5.** _____

For the same number, which number is in the ones place? _____

6. How many successful space launches did the U.S. have in 2004? **6.** _____

Successful Space Launches

	2003	**2004**	**2005**
Russia	21	22	23
United States	23	16	12

Source: Library of Congress

7. In the number 493, identify the value of the digit 3. **7.** _____

8. What is the word name for 277? **8.** _____

9. What is the word name for 9,200? **9.** _____

10. Angie bought new towels for her bathroom for $147. What word name should she write on the check? **10.** _____

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Name:_____

Additional Exercises 1.1 Form II

Date:_____

1. Write 352 in expanded form. **1.** _____

2. Write 85,264 in expanded form. **2.** _____

3. Write $80,000 + 7000 + 300 + 6$ in standard notation. **3.** _____

4. Write $100,000 + 30,000 + 4000 + 600 + 80 + 9$ in standard notation. **4.** _____

5. For the number 16,256, which number is in the thousands place? **5.** _____

For the same number, which number is in the tens place? _____

6. How many credit unions had assets of $3.0 billion or more in 2006? **6.** _____

Number of Selected Financial Institutions, 2006

Asset Size	Commercial Banks	Savings Institutions	Credit Unions
Less than $100.0 million	3245	387	7162
$100.0 million to $999.9 million	3663	737	1085
$1.0 billion to to $2.9 billion	289	88	96
$3.0 billion or more	205	67	19

Source: U.S. Statistical Abstract, 2008

7. In the number 19,325, identify the value of the digit 3. **7.** _____

8. What is the word name for 235,060? **8.** _____

9. What is the word name for 64,658,009? **9.** _____

10. Cheryl bought new windows for her house for $7092. What word name should she write on the check? **10.** _____

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Name:_____

Additional Exercises 1.1 Form III

Date:_____

1. Write 29,413 in expanded form. **1.** _____

2. Write 627,302 in expanded form. **2.** _____

3. Write $400,000+80,000+800+30+4$ in standard notation. **3.** _____

4. Write $3,000,000+700,000+400+3$ in standard notation. **4.** _____

5. For 9,276,154, which digit is in the ten thousands place? **5.** _____

For the same number, which digit is in the millions place? _____

6. How much did federal credit unions have in outstanding loans in 2005? **6.** _____

Federal Chartered Credit Unions – Summary

Year	Members (1,000)	Assets (mil. dol.)	Loans Outstanding (mil. dol.)	Savings (mil. dol.)
2004	46,858	358,701	223,878	308,317
2005	47,612	377,804	249,515	321,820
2006	48,262	394,125	270,420	333,914

Source: U.S. Statistical Abstract, 2008

7. In the number 34,205,781, identify the value of the digit 3. **7.** _____

8. What is the word name for 7,103,447? **8.** _____

9. What is the word name for 291,320,992? **9.** _____

10. Payton purchased a new 2008 Hyundai Elantra for $16,875. What word name would be written on her contract? **10.** _____

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Name:_____

Additional Exercises 1.2 Form I

Date:_____

1. Add: $\begin{array}{r} 2 \\ 9 \\ +\ 4 \\ \hline \end{array}$ **1.** _____

2. Add: $\begin{array}{r} 34 \\ 13 \\ +\ 22 \\ \hline \end{array}$ **2.** _____

3. Add: $\begin{array}{r} 3,620 \\ 4,006 \\ +\ \ 798 \\ \hline \end{array}$ **3.** _____

4. Add: $\begin{array}{r} 7,306,533 \\ +\ 2,708,599 \\ \hline \end{array}$ **4.** _____

5. Add: $487 + 159 + 93$ **5.** _____

6. Add: $23{,}410 + 30{,}100 + 5{,}425$ **6.** _____

7. Last year a company had 5876 employees. This year the number of employees increased by 1386. How many employees does the company have now? **7.** _____

8. A town's population in 1990 was 208,121. By the year 2008, it had increased by 23,430. How many people lived there in 2008? **8.** _____

9. Beth is planting a garden in her back yard that has different measurements on each side: 10 feet, 6 feet, 8 feet, and 9 feet. How many feet of wiring are needed to enclose her garden? **9.** _____

10. A store sold 38 CD players on Monday, 16 on Tuesday, and 27 on Wednesday. How many CD players did the store sell in all? **10.** _____

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Name:_____

Additional Exercises 1.2 Form II

Date:_____

1. Add:
$$\begin{array}{r} 8 \\ 7 \\ 2 \\ +\ 9 \\ \hline \end{array}$$

1. _____

2. Add:
$$\begin{array}{r} 26 \\ 39 \\ 41 \\ +\ 89 \\ \hline \end{array}$$

2. _____

3. Add:
$$\begin{array}{r} 1652 \\ 2139 \\ 714 \\ 82 \\ 5 \\ +\ 9673 \\ \hline \end{array}$$

3. _____

4. Add:
$$\begin{array}{r} 9,216,823 \\ 4,781,244 \\ +\ 17,558 \\ \hline \end{array}$$

4. _____

5. Add: $11,296 + 81,619 + 42,543 + 692$

5. _____

6. Add: $84 + 197 + 1933 + 16,467$

6. _____

7. Pam's checking account has a balance of $2,046. She makes deposits of $1055 and $2,593. What is her balance after making the deposits?

7. _____

8. One day, Angie eate 380 calories for breakfast, 477 calories for lunch, 120 calories for snacks, and 620 calories for dinner. How many calories did she consume that day?

8. _____

9. Jesse is installing a privacy fence in his back yard that has different measurements on each side: 101 feet, 66 feet, 87 feet, and 98 feet. How many feet of fencing are needed to enclose his yard?

9. _____

10. It is 91 miles from Waterton to Hartford. It is 83 miles from Hartford to Cayfield. Driving directly, it is 137 miles from Waterton to Cayfield. If Juan drives from Waterton to Hartford, then from Hartford to Cayfield, and finally directly home to Waterton, how many miles does he drive?

10. _____

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Name:_____

Additional Exercises 1.2 Form III

Date:_____

1. Add:
$$\begin{array}{r} 12 \\ 13 \\ 97 \\ 78 \\ +\ 12 \\ \hline \end{array}$$

1. _____

2. Add:
$$\begin{array}{r} 59 \\ 755 \\ 4,693 \\ 875,675 \\ +\ 165,371,123 \\ \hline \end{array}$$

2. _____

3. Add:
$$\begin{array}{r} 2,440,220 \\ 4,286,842 \\ 9,020,415 \\ 14,770,683 \\ +\ 4,003,454 \\ \hline \end{array}$$

3. _____

4. Add:
$$\begin{array}{r} 432 \\ 66 \\ 7,620 \\ 37 \\ 23,756 \\ 877 \\ +\ 1,965,045 \\ \hline \end{array}$$

4. _____

5. Add: $7963 + 740 + 26 + 5183 + 7549 + 2004 + 718$

5. _____

6. Add: $11,222 + 22,333 + 23,111 + 78,901 + 291,785$

6. _____

7. Isabelle went shopping for holiday presents for her family. She spent $303 on Monday, $320 on Tuesday, and $213 on Wednesday. What is the total amount of money that she spent on gifts?

7. _____

8. An election of student body president was held over 3 days. On the first day Todd received 206 votes and Bonnie received 138 totes. On the second day Todd received 298 votes and Bonnie received 346 votes. On the third day Todd received 219 votes and Bonnie received 169 votes. How many votes did Bonnie receive?

8. _____

9. Incoming Freshmen at a state university are required to pay a $305 student orientation fee, a $75 student activity fee, a $52 health services fee, a $100 athletic fee, and a $50 parking fee. If tuition/books cost $8,458 and room and board costs $7,590, what is the total cost for Freshman year?

9. _____

10. Marie joins a summer reading club at her library. To reach the prize level, she must read for 375 more minutes. She read for 65 minutes on Monday, 75 minutes on Tuesday, 44 minutes on Wednesday, and 117 minutes on Thursday. If she does not read on Friday, but reads for 90 minutes on Saturday, how many additional minutes will she have for the week? Will she have enough for the next prize level?

10. _____

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Name:_____

Additional Exercises 1.3 Form I

Date:_____

1. Subtract: $\begin{array}{r} 95 \\ -\ 12 \\ \hline \end{array}$ **1.** _____

2. Subtract: $\begin{array}{r} 673 \\ -\ 251 \\ \hline \end{array}$ **2.** _____

3. Subtract: $\begin{array}{r} 83 \\ -\ 56 \\ \hline \end{array}$ **3.** _____

4. Subtract: $\begin{array}{r} 7020 \\ -\ 4562 \\ \hline \end{array}$ **4.** _____

5. Is the subtraction correct? $\begin{array}{r} 67 \\ -\ 43 \\ \hline 24 \end{array}$ **5.** _____

6. Is the subtraction correct? $\begin{array}{r} 474 \\ -\ 53 \\ \hline 431 \end{array}$ **6.** _____

7. Solve: $x + 7 = 15$ **7.** _____

8. In February 2007, Nintendo sold 335,000 Wii game consoles while Microsoft's Xbox 360 sold 228,000 consoles. How many more Wii consoles were sold than Xbox 360 consoles? **8.** _____

9. In 2008, *Indiana Jones and the Kingdom of the Crystal Skull* opened on a Thursday at about 2000 venues. The next day, the film was showing at about 4,260 venues. How many more venues showed the film on Friday than on Thursday? **9.** _____

10. What was the increase in population in Carefree, AZ from 1990 to 2007? **10.** _____

Year	Population in Carefree, AZ
1990	1,615
2000	2,927
2007	4,002

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Name:_____

Additional Exercises 1.3 Form II

Date:_____

1. Subtract: $\begin{array}{r} 689 \\ -\ 213 \\ \hline \end{array}$ **1.** _____

2. Subtract: $\begin{array}{r} 8923 \\ -\ 2711 \\ \hline \end{array}$ **2.** _____

3. Subtract: $\begin{array}{r} 841 \\ -\ 153 \\ \hline \end{array}$ **3.** _____

4. Subtract: $\begin{array}{r} 70,000 \\ -\ 26,815 \\ \hline \end{array}$ **4.** _____

5. Subtract: $\begin{array}{r} 703,196 \\ -\ 215,589 \\ \hline \end{array}$ **5.** _____

6. Is the subtraction correct? $\begin{array}{r} 805 \\ -\ 623 \\ \hline 202 \end{array}$ **6.** _____

7. Solve: $x + 210 = 579$ **7.** _____

8. Janet has a total of $3301 in her checking account. If she writes a check for each of the items below, how much money will be left in her account?
Phone: $48, Rent : $750, Car: $429 **8.** _____

9. Svetlana is trading her car in on a new car. The new car costs $25,025. The car is worth $7998. How much money does she need to buy the new car? **9.** _____

10. The population of Marion County is 664,446. The population of Farmington County is 295,129. The population of Cross County is 283,945. How much greater is the population of Marion County than Cross County? **10.** _____

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Name:_____

Additional Exercises 1.3 Form III

Date:_____

1. Subtract: $\begin{array}{r} 6875 \\ -\ 2133 \\ \hline \end{array}$ **1.** _____

2. Subtract: $\begin{array}{r} 80,000 \\ -\ 32,681 \\ \hline \end{array}$ **2.** _____

3. Subtract: $\begin{array}{r} 600,152 \\ -\ 206,985 \\ \hline \end{array}$ **3.** _____

4. Subtract: $\begin{array}{r} 470,884 \\ -\ 136,836 \\ \hline \end{array}$ **4.** _____

5. Subtract: $\begin{array}{r} 75,910,426 \\ -\ 34,276,460 \\ \hline \end{array}$ **5.** _____

6. Is the subtraction correct? $\begin{array}{r} 423,556 \\ -\ 32,620 \\ \hline 391,136 \end{array}$ **6.** _____

7. Solve: $x + 306,771 = 693,822$ **7.** _____

For exercises 8 – 10, use the following table:

Population of Four States from 1960 to 2000

State	1960	1970	1980	1990	2000
Illinois	10,081,158	11,102,853	11,427,409	11,430,602	12,051,683
Michigan	7,823,194	8,881,826	9,262,044	9,295,297	9,679,052
Indiana	4,662,498	5,195,392	5,490,212	5,554,159	6,045,521
Minnesota	3,413,864	3,806,103	4,075,970	4,375,099	4,830,784

Source: US Census Bureau

8. In 1990, how much more was the combined population of Illinois and Indiana than the combined population of Michigan and Minnesota **8.** _____

9. How much more was the population increase of Illinois than the population increase of Indiana from 1980 to 2000? **9.** _____

10. Between what two years did Indiana's population grow the most? **10.** _____

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Name:_____

Additional Exercises 1.4 Form I

Date:_____

1. Multiply: $\begin{array}{r} 27 \\ \times\ 5 \\ \hline \end{array}$ **1.** _____

2. Multiply: $\begin{array}{r} 208 \\ \times\ 4 \\ \hline \end{array}$ **2.** _____

3. Multiply: $\begin{array}{r} 62 \\ \times 10 \\ \hline \end{array}$ **3.** _____

4. Multiply: $\begin{array}{r} 73 \\ \times\ 11 \\ \hline \end{array}$ **4.** _____

5. Multiply: $\begin{array}{r} 9401 \\ \times\ 32 \\ \hline \end{array}$ **5.** _____

6. Multiply: $5 \cdot 7 \cdot 2$ **6.** _____

7. A traveler rents a mid-size car at $55 per day for ten days. What is the cost for the car rental during this time? **7.** _____

8. A rectangular plot of land measures 80 feet by 150 feet. Find its area. **8.** _____

9. In a distant solar system the diameter of Plant A is 5 times as great as the diameter of Planet B. The diameter of Planet B is 720 miles. Find the diameter of Planet A. **9.** _____

10. Alan buys 6 used DVDs from a video store. If each DVD costs $7, how much did he spend on the DVDs? **10.** _____

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Name:_____

Additional Exercises 1.4 Form II

Date:_____

1. Multiply: $\begin{array}{r} 1892 \\ \times \quad 7 \\ \hline \end{array}$ **1.** _____

2. Multiply: $\begin{array}{r} 7039 \\ \times \quad 40 \\ \hline \end{array}$ **2.** _____

3. Multiply: $\begin{array}{r} 6492 \\ \times \quad 100 \\ \hline \end{array}$ **3.** _____

4. Multiply: $\begin{array}{r} 483 \\ \times \quad 691 \\ \hline \end{array}$ **4.** _____

5. Multiply: $\begin{array}{r} 3904 \\ \times \quad 705 \\ \hline \end{array}$ **5.** _____

6. Multiply: $14 \cdot 3 \cdot 2 \cdot 5$ **6.** _____

7. Find the value for x in the equation $72 = 24(x)$. **7.** _____

8. The textbook for a history class costs \$63. There are 23 students in the class. Find the total cost of the history books for the class. **8.** _____

9. The seats in a lecture hall are arranged in 17 rows with 9 seats in each row. Find how many seats are in this room. **9.** _____

10. A case of candy bars has 2 layers of candy bars. In each layer are 8 rows with 14 candy bars in each row. Find how many candy bars are in a case. **10.** _____

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Name:_____

Additional Exercises 1.4 Form III

Date:_____

1. Multiply: $\begin{array}{r} 15{,}815 \\ \times \quad 8 \\ \hline \end{array}$ **1.** _____

2. Multiply: $\begin{array}{r} 7900 \\ \times \ 600 \\ \hline \end{array}$ **2.** _____

3. Multiply: $\begin{array}{r} 9829 \\ \times \ 454 \\ \hline \end{array}$ **3.** _____

4. Multiply: $\begin{array}{r} 12{,}305 \\ \times \ 2{,}418 \\ \hline \end{array}$ **4.** _____

5. Multiply: $6 \cdot 40 \cdot 9 \cdot 13 \cdot 15$ **5.** _____

6. Multiply: $5 \cdot 150 \cdot 34 \cdot 220$ **6.** _____

7. Find the value for x in the equation $848 = 16(x)$. **7.** _____

8. Amy pays a babysitter $5 per hour to watch her son for three hours each evening while she attends classes. If she attends class three days each week for 16 weeks, how much will she pay for babysitting? **8.** _____

9. An elementary school plans to upgrade its computer lab. The school needs to buy 20 new computers, 6 new chairs, and 30 software bundles. If computers cost $800 each, chairs cost $65 each, and software bundles are $215 each, how much will it cost the school to upgrade the lab? **9.** _____

10. There are 78 kittens in a room with an assortment of black and white ears and paws. 15 kittens have totally black ears and 3 white paws, 22 have 1 black ear and 2 white paws, and 41 have no black ears and 1 white paw. How many black paws are in the room? **10.** _____

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Name:_____

Additional Exercises 1.5 Form I

Date:_____

1. Divide: $5\overline{)75}$ **1.** _____

2. Divide: $6\overline{)54}$ **2.** _____

3. Divide: $7\overline{)140}$ **3.** _____

4. Divide: $9\overline{)437}$ **4.** _____

5. Divide: $13\overline{)338}$ **5.** _____

6. Divide: $24\overline{)5120}$ **6.** _____

7. Divide: $258 \div 258$ **7.** _____

8. A group of 12 friends rent a houseboat for the weekend. The total cost of the rental was $864. How much should each friend contribute to the rental? **8.** _____

9. While upgrading their computer lab, an elementary school spent $3000 on 20 new flat screen monitors. How much did each monitor cost? **9.** _____

10. Nathan's truck averages 25 miles per gallon. If he can travel 325 miles on one tank of gas, how many gallons does the tank hold? **10.** _____

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Name:_____

Additional Exercises 1.5 Form II

Date:_____

1. Divide: $8\overline{)72}$ **1.** _____

2. Divide: $3\overline{)2700}$ **2.** _____

3. Divide: $53\overline{)51,251}$ **3.** _____

4. Divide: $6\overline{)1946}$ **4.** _____

5. Divide: $16\overline{)15,773}$ **5.** _____

6. Divide: $5463 \div 24$ **6.** _____

7. For the equation $3393 \div 261 = x$, what is the value of x? **7.** _____

8. Amy teaches Chinese lessons for $65 per student for a 6-week session. From one group of students, she collects $1820. Find how many students are in the group. **8.** _____

9. One ticket won a prize of $9,338,000. The winning ticket was purchased by 29 people who had pooled their money. Find how many dollars each person received if each receive an equal share. **9.** _____

10. In a distant galaxy the gravity of Planet A is 218 times as strong as the gravity of Planet B, so objects on Planet A weigh 218 times as much as they weigh on Planet B. If the object weighs 33,572 pounds on Planet A, how much does it weigh on Planet B? **10.** _____

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Name:_____

Additional Exercises 1.5 Form III

Date:_____

1. Divide: $9\overline{)7380}$ **1.** _____

2. Divide: $14\overline{)12,344}$ **2.** _____

3. Divide: $53\overline{)113,261}$ **3.** _____

4. Divide: $425,075 \div 220$ **4.** _____

5. Divide: $645\overline{)18,709}$ **5.** _____

6. For the equation $2907 \div 171 = x$, what is the value of x? **6.** _____

7. Mrs. Monroe has a piece of wire 18 feet long that she cuts into pieces for an experiment in her physics class. Each piece of wire is to be 8 inches long. How many 8-inch-long pieces of wire can she cut from the original piece of wire? **7.** _____

8. A dairy produces 1,320,000 pints of milk each day. There are 2 pints in a quart and 4 quarts in a gallon. How many gallons of milk are produced each day? **8.** _____

9. Karl wishes to pay off a car loan of $5016 in 2 years. How large will his monthly payment be assuming equal payments? **9.** _____

10. County records list a rectangular parcel of land as measuring 50,463 square yards. A surveyor measures the length of the parcel of land as 267 yards. What is the width of the parcel? **10.** _____

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Name:_____

Additional Exercises 1.6 Form I

Date:_____

1. Rewrite using exponents: $3 \times 3 \times 3$ **1.** _____

2. Rewrite using exponents: 7×7 **2.** _____

3. Evaluate: 2^5 **3.** _____

4. Evaluate: 4^3 **4.** _____

5. $12 \div 4 - 1$ **5.** _____

6. $\left(40 - 5^2\right) \div 3$ **6.** _____

7. $6 \times 7 + 4 \times 8$ **7.** _____

8. $4^2 - 13 + 22 + 2^3$ **8.** _____

9. $810 \div 9 - 6 \times 5$ **9.** _____

10. $2 \times 4 + 3(5 + 7) - 2$ **10.** _____

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Name:_____

Additional Exercises 1.6 Form II

Date:_____

1. Rewrite using exponents: $6 \times 6 \times 6 \times 6$ **1.** _____

2. Rewrite using exponents: $9 \times 9 \times 9$ **2.** _____

3. Evaluate: 2^6 **3.** _____

4. Evaluate: 3^5 **4.** _____

5. $240 \div 6 - 2$ **5.** _____

6. $10^2 - 5 \times 8$ **6.** _____

7. $18 \times 8 + 5 \times 3$ **7.** _____

8. $4^3 + 2^2 - 48 + 30$ **8.** _____

9. $12 + 12 \div 4 + 6 \times 8$ **9.** _____

10. $2 \times 5 + 9(9 + 7) + 7$ **10.** _____

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Name:_____

Additional Exercises 1.6 Form III

Date:_____

1. Rewrite using exponents: $15\times15\times15\times15\times15\times15\times15\times15$ **1.** _____

2. Rewrite using exponents: $7\times7\times7\times7\times7\times7\times7\times7\times7$ **2.** _____

3. Evaluate: 16^5 **3.** _____

4. Evaluate: 10^8 **4.** _____

5. Evaluate: $8\times(3+2)^3\times6+3^4-18$ **5.** _____

6. Evaluate: $12^3\div6^2+(7-5)^3\times4+18\div9$ **6.** _____

7. Evaluate: $(1932\div3)\div(28\div4)\times15+10$ **7.** _____

8. Evaluate: $5000-8^4+8^2+(47-34)\times26$ **8.** _____

9. Evaluate: $14^2-8^2+12^2-4^2\times9$ **9.** _____

10. Evaluate: $21\times7\times(24-20)\div12-7^2$ **10.** _____

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Name:_____

Additional Exercises 1.7 Form I

Date:_____

1. Round 78 to the nearest ten. **1.** _____

2. Round 545 to the nearest hundred. **2.** _____

3. Round 3,691 to the nearest hundred. **3.** _____

4. A website logged 413,592 hits in one day. Round the number of hits to the nearest thousand. **4.** _____

In problems 5 and 6, use the principle of estimation to find an estimate for the calculation.

5. $298 + 815 + 720$ **5.** _____

6. 72×91 **6.** _____

7. Estimate the result of the calculation. Use your result to determine if the calculation appears to be correct or incorrect. **7.** _____

$$\begin{array}{r} 754 \\ -\ 271 \\ \hline 435 \end{array}$$

8. A box of cereal contains 640 grams. If a serving size is 35 grams, estimate the number of servings per box. **8.** _____

9. A rental condominium in Ft. Walton Beach, Florida costs $328 per day during peak season. Estimate the cost of a 9-day rental during peak season. Round the cost per day and number of days to the nearest ten. **9.** _____

10. As part of her preparation for lacrosse tryouts, Tori did 79 push-ups each day for 83 days. Estimate how many push-ups she did during that period. Round the number of push-ups and the number of days to the nearest ten. **10.** _____

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Name:_____

Additional Exercises 1.7 Form II

Date:_____

1. Round 8867 to the nearest ten. **1.** _____

2. Round 5023 to the nearest hundred. **2.** _____

3. Round 83,619 to the nearest thousand. **3.** _____

4. A publishing company sold 27,266,591 books in 2003 Round the number of books sold to the nearest ten-million. **4.** _____

In problems 5 and 6, use the principle of estimation to find an estimate for the calculation.

5. $897,248 - 340,002$ **5.** _____

6. $723,198 \times 216$ **6.** _____

7. Estimate the result of the calculation. Use your result to determine if the calculation appears to be correct or incorrect. **7.** _____

$$\begin{array}{r} 822,206 \\ -\ 388,671 \\ \hline 433,535 \end{array}$$

8. The Pan family took a trip and traveled 365 miles, 449 miles, 639 miles, 798 miles, and 460 miles on five consecutive days. Round each distance to the nearest hundred and estimate the distance they traveled. **8.** _____

9. A local sandwich shop sells 151 sandwiches on an average day. Estimate how many sandwiches they sold in the last 237 days. Round the number of sandwiches and the number of days to the nearest ten. **9.** _____

10. Paul traveled for 4 weeks in Africa last year and spent $1847 while he was there. Estimate the average amount he spent each day. Round the number of days to the nearest ten and the amount of money spent to the nearest hundred. **10.** _____

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Name:_____

Additional Exercises 1.7 Form III

Date:_____

1. Round 59,112 to the nearest hundred. **1.** _____

2. Round 439,458 to the nearest ten thousand. **2.** _____

3. Round 234,581,047,219 to the nearest ten million. **3.** _____

4. In 2007 a company spent $934,979,234 on advertising. Round the advertising figure to the nearest hundred-thousand. **4.** _____

In problems 5 and 6, use the principle of estimation to find an estimate for the calculation.

5. $190,277 + 38,629 + 554,107$ **5.** _____

6. $2,364,197 \div 437$ **6.** _____

In questions 7 and 8, estimate the result of the calculation. Use your result to determine if the calculation appears to be correct.

7.
$$\begin{array}{r} 853 \\ 310 \\ 638 \\ 221 \\ +\ 3772 \\ \hline 5794 \end{array}$$
7. _____

8.
$$\begin{array}{r} 5,670,261 \\ -\ 3,321,443 \\ \hline 2,148,818 \end{array}$$
8. _____

9. Glenn wants to buy a refrigerator for $1299, a stove for $769, a dishwasher for $549, and a microwave for $179. Estimate his total cost for the appliances. Round each cost to the nearest hundred to estimate the total cost. **9.** _____

10. An orchard contains 72 acres of apple trees. Each acre contains 132 apple trees and each tree produces 175 apples. If it takes 36 apples to make one gallon of apple cider, estimate the number of gallons of apple cider that could be made from the orchard's harvest. Round each value to the nearest ten. **10.** _____

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Name:_____

Additional Exercises 1.8 Form I

Date:_____

1. Matt bought four color ink cartridges for his printer. If the total cost was $72, how much did each cartridge cost? **1.** _____

2. A store orders 25 cases of snack crackers. Each case contains 132 snack crackers. How many snack crackers did the store order? **2.** _____

3. Leslie enjoys skiing in the winter. Last year she skied 27 times and spent a total of $756. How much did it cost her each time? **3.** _____

4. A plot of land that is up for sale is advertised as 41 acres. If there are 4840 square yards in an acre, how many square yards does the plot of land cover? **4.** _____

5. The Spring City school system has 2953 high school students, 4018 middle school students, and 6079 elementary school students. How many total students are in the Spring City school system? **5.** _____

6. Bobby had $328 in his checking account. He deposited his paycheck for $217 and wrote a check for $65. What is the balance in his account? **6.** _____

7. In 2007, Disney's Magic Kingdom had about 17,060,000 visitors. That same year, Disneyland had about 14,870,000 visitors. How many more visitors did the Magic Kingdom have in 2007? **7.** _____

8. Jake lives 17 miles from his workplace. In a five-day work week, how many total miles will Jake travel to get to and from work? **8.** _____

9. How many total medals did the top five countries win in the 2006 Winter Olympics? **9.** _____

Top Medal Winners, 2006 Winter Olympics

Germany	United States	Austria	Russia	Canada
29	25	23	22	24

10. Todd bought an antique radio for $35 at a estate sale. He spent $48 on material to refurnish the radio and resold it for $190. What was Todd's profit on the radio? **10.** _____

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Name:_____

Additional Exercises 1.8 Form II

Date:_____

1. A corporate executive picks up a rental car that has an odometer reading of 35,829 miles on it. When she returns it, the odometer reads 36,728 miles. How many miles did she drive the rental car?

1. _____

2. As part of a fund raiser, Jackson bought 3 $25 gift cards to Applebees, 8 $10 gift cards to Starbucks, and 2 $50 gift cards to a local grocery store. How much did he spend on gift cards?

2. _____

3. An airplane is flying west at an altitude of 33,485 feet. Another plane is flying southwest at an altitude of 30,785 feet. How much above the southwest-bound plane is the west-bound plane when their paths cross?

3. _____

4. Tom bought 6 books at $19.85 each and 3 CDs at $6.42 each. What was the total of his purchases?

4. _____

5. Sarah reads one magazine each weekday (Monday-Friday). How many magazines does she read in one year (52 weeks)?

5. _____

6. Jorie had a balance of $129 in her checking account. Since then she made a deposit of $515, wrote checks for $138 and $235, and made an ATM withdrawal for $80. When all of the transactions have been posted to her account, what balance will she have in her checking account?

6. _____

7. Frank can type 36 words each minute. How many words can he type in a typical 8-hour day?

7. _____

8. Barbara bought 73 shares of stock for $3504. How much did the stock cost per share?

8. _____

9. Jorge was just promoted to assistant store manager of a Wal-Mart store. He bought two suits at $250 each, two shirts at $31 each, two pairs of shoes at $75 each, and three ties at $21 each. What was the total cost of his new work wardrobe?

9. _____

10. Every 60 minutes, the world population increases by 100,000 people. How many people will be born during the next 420 minutes?

10. _____

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Name:_____

Additional Exercises 1.8 Form III

Date:_____

1. A store has gross revenues of $6105, $4571, $7276, and $7014 in its first four weeks of business. What was the gross revenue for those four weeks? **1.** _____

2. Arika sells computers and earns $200 per week plus $50 for each computer she sells. If she sells 12 computers in a week, how much will she earn (before taxes)? **2.** _____

3. Delaney buys 7 photo albums. Three of the albums can hold 30 pages and the other four can hold 20 pages. Each page can hold 6 photos. How many photos can she store in the 7 albums? **3.** _____

4. A condominium resort on the Gulf of Mexico has three times as many two-bedroom units as three bedroom units and four times as many one-bedroom units as two-bedroom units. If there are 20 three-bedroom units, how many total units are at the resort? **4.** _____

5. Caitlyn wanted to determine the gas mileage she was getting on her car. She filled the gas tank on her car when the odometer read 25,165 miles. After 9 days, the odometer read 25,354 miles and it took 7 gallons of gas to fill the tank. How many miles to the gallon did Caitlyn's car achieve? **5.** _____

6. Lauren owns 16 acres of land that she rents to a farmer for $2313 per acre per year. Her property taxes are $758 per acre per year. How much profit does she make on the land each year? **6.** _____

7. In preparation for his new job, Tristan bought two suits at $184 apiece, four shirts at $27 apiece, two pairs of shoes at $72 a pair, four ties at $27 apiece, and five pairs of socks at $5 a pair. What was the total cost of these items? **7.** _____

8. Jara had a balance of $59 in his checking account. Since then he made deposits of $147, $484, and $341 and wrote checks for $55, $128, $177, and $357. When all of the deposits are recorded and all of the checks clear, what balance will he have in his checking account? **8.** _____

9. In 2007, the top five theme parks in the United States were Disney's Magic Kingdom (17,060,000 visitors), Disneyland (14,870,000 visitors), Epcot (10,930,000 visitors), Disney-MGM Studios (9,510,000 visitors), and Disney's Animal Kingdom (9,490,000 visitors). How many total visitors did the five parks have in 2007? **9.** _____

10. Jordyn bought a second house as an investment. She purchased the house for $85,000 and made improvements totaling $22,000. She puts the house on the market for $125,000 but, due to a slow economy, has to reduce the price by $5000 to sell it. What was her profit on the house? **10.** _____

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Activity 1-A

Whole Numbers

Following Oral Directions

Read the following examples to the class, leaving time for students to compute the answers. When all are complete, compare answers and solve as a class.

1. Start with 6; double it; add 3; divide by 5; the answer is _____ .
2. Start with 13; subtract 3; add 5; add 3; divide by 6; the answer is ____ .
3. Start with 10; add 15; divide by 5; multiply by 4; add 8; divide by 4; the answer is ___.
4. From a number that is 5 larger than 12, add 5; divide by 2, subtract 4; the answer is ___.
5. From a number that is 2 smaller than 7, add 6; add 7; multiply by 2; divide by 3; the answer is _____.
6. Add 6 to 10; subtract 4; add 10; subtract 13; double it; the answer is ____.
7. Add 4 to 8; add 9; add 7; add 9; add 9; divide by 2; the answer is _____.
8. Subtract 6 from 13; add 5; multiply by 5; subtract 20; subtract 10; add 1; the answer is___.
9. From a number that is 14 larger than 6, add 5; divide by 5, multiply by 3; add 1; the answer is _____ .
10. Take the square root of 16; add 5; add 16; divide by 5; add 3; divide by 2; the answer is ____
11. From a number that is 5 larger than 3; subtract 3; add 2; add 3; add 8; divide by 2; the answer is _____ .
12. In the series of numbers, 4-9-8-3-9-12, the first three numbers were _____.
13. In the series of numbers, 2-6-7-9-7-6-8, the sum of the first three numbers is ____.
14. In the series of numbers, 11-9-4-8-7-9-6-12, the lowest odd number is _____.
15. In the series of number, 4-6-7-3-6-1-3-9, the sum of these numbers is _____.

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Activity 1-B

Whole Numbers

Multiplication Table

Complete the multiplication table. Use it to help practice your multiplication facts.

x	0	1	2	3	4	5	6	7	8	9	10	11	12
0													
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													

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Activity 2-A

Fractions

How Much Pudding Do You Need?

You have decided to make Indian Pudding for three different holiday parties you will be attending. The table below shows how many servings of the pudding you will need for each party. The recipe you found shows the ingredients for 16 servings of pudding.

In this activity you will calculate the ingredient measurements for the other two parties and fill in the table.

Ingredient	**Party #1** 16 Servings	**Party #2** 8 Servings	**Party #3** 24 Servings
Milk	8 cups		
Cream of Wheat Cereal	1 ½ cup		
Butter	4 tbsp		
Light Molasses	1 cup		
Egg	2		
Firmly packed light brown sugar	½ cup		
Ground cinnamon	1 ½ tsp		
Ground ginger	¾ tsp		

Try It At Home!

In a large saucepan, over medium heat, bring milk to a boil; gradually sprinkle in cereal, stirring constantly. Heat to a boil, stirring constantly; reduce heat. Cook 5 minutes for regular, 3 to 4 minutes for quick, and 2 to 3 minutes for instant cereal, stirring occasionally until thickened. Remove from heat, stir in margarine, molasses, egg, brown sugar, cinnamon, and ginger.

Spoon mixture into 16 greased custard cups (6-oz size). Bake at 350° F for 20 minutes. Serve warm with frozen yogurt, if desired.

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Activity 2-B

Fractions

Fraction Puzzle-Carefully cut the pieces apart. Put the puzzle back together matching the correct improper fraction with the correct proper fraction. Be sure to simplify!

$\frac{1}{11}$ 14 $\frac{13}{3}$ $\frac{48}{32}$	10 $4\frac{1}{3}$ $2\frac{1}{5}$ $\frac{20}{5}$	$3\frac{1}{9}$ $\frac{132}{60}$ $\frac{36}{5}$ $8\frac{5}{20}$	$\frac{11}{12}$ $7\frac{1}{5}$ $\frac{2}{13}$ $\frac{38}{5}$
$1\frac{1}{2}$ $8\frac{2}{3}$ $\frac{15}{12}$ $\frac{137}{137}$	4 $1\frac{1}{4}$ $9\frac{6}{8}$ 0	$\frac{33}{4}$ $\frac{39}{4}$ $\frac{38}{11}$ $7\frac{2}{20}$	$7\frac{3}{5}$ $3\frac{5}{11}$ $\frac{4}{9}$ $8\frac{1}{5}$
1 $3\frac{5}{6}$ $8\frac{1}{7}$ $1\frac{1}{4}$	$\frac{0}{4}$ $\frac{57}{7}$ $\frac{29}{10}$ $3\frac{1}{6}$	$\frac{71}{10}$ $2\frac{9}{10}$ $\frac{44}{7}$ $2\frac{4}{7}$	$\frac{41}{5}$ $6\frac{2}{7}$ $\frac{23}{6}$ $\frac{23}{11}$
$\frac{10}{8}$ $8\frac{7}{10}$ $\frac{100}{24}$ $\frac{2}{9}$	$\frac{19}{6}$ $4\frac{1}{6}$ $\frac{9}{8}$ $10\frac{2}{3}$	$\frac{18}{7}$ $1\frac{3}{24}$ $\frac{90}{11}$ $\frac{1}{90}$	$2\frac{1}{11}$ $8\frac{2}{11}$ $3\frac{8}{11}$ $\frac{4}{10}$
$\frac{14}{63}$ $\frac{41}{11}$ $5\frac{8}{9}$ $3\frac{4}{7}$	$\frac{64}{6}$ $\frac{53}{9}$ $2\frac{4}{11}$ $\frac{50}{5}$	$\frac{3}{270}$ $\frac{26}{11}$ $5\frac{5}{6}$ $\frac{29}{5}$	$\frac{2}{5}$ $\frac{35}{6}$ $\frac{87}{10}$ $\frac{8}{0}$

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Activity 3-A

Decimals

Which One Doesn't Belong?

In each row, circle the item that does not belong. Be prepared to give the reason for your answer. Reasons may vary.

	A	B	C	D
1	$4\frac{1}{2}$	$\frac{9}{2}$	4.5	9.2
2	$\frac{21}{28}$	0.75	$\frac{30}{40}$	$\frac{16}{64}$
3	$\frac{1}{5}, \frac{4}{5}$	$\frac{2}{5}, 0.6$	0.34, 0.66	$\frac{4}{9}, \frac{6}{9}$
4	$1.04 \div 0.02$	$1.28 \div 0.04$	$\frac{312}{6}$	$1.56 \div 0.03$
5	$2.76 + 0.45$	$12.91 - 9.7$	$8.21 - 5.49$	$3\frac{21}{100}$
6	0.125	0.875	0.555	0.375
7	0.06	$\frac{3}{5}$	0.6	$\frac{9}{15}$
8	(0.05)(8)	$\left(\frac{1}{2}\right)\left(\frac{1}{4}\right)$	$\frac{1}{16} \times 2$	(2.5)(0.05)

Create your own problem where one item does not belong. Be ready to discuss your example.

	A	B	C	D
9				

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Activity 3-B

Decimals

Who's Greater?

In each row write:

A if the first item is greater
B if the second item is greater
C if they are equal
D if there's not enough information to decide

	FIRST ITEM	SECOND ITEM	RESPONSE
1	$\frac{1}{2} \times 18.2$	4.5×2	
2	0.666	$\frac{2}{3}$	
3	$0.5 + 0.2 + 0.8$	0.15	
4	8.2×1000	820×100	
5	$(0.7)^3$	$(0.7)^2$	
6	3.06×10^4	30.6×10^3	
7	$1 \div 0.1$	$0.1 \div 1$	
8	5/8 of a pizza	0.625 of a pizza	

Extension: Select any problem on this page and explain your thinking in arriving at the response you selected.

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Activity 4-A

Ratio and Proportion

Writing with Ratios and Proportions

Write one or more complete sentences to answer each question. Answers may vary.

1. When writing a ratio, how do you decide which value is the numerator and which value is the denominator?

2. How do you write the ratio of 6 quarts to 6 gallons?

3. Would you prefer that the ratio of your income (money earned) to your expenses be 1 to 4 or 4 to 1?

4. Find a sales flyer for a local clothing store. Find two items that are similar and discuss which item is the better buy and why. Be sure to include unit rates.

5. Allison worked 5.5 hours and cleaned 110 appliances. Amy cleaned 148 appliances in 9 hours. To see whether the employees worked equally fast, Ray (the supervisor) set up this proportion:

$$\frac{5.5}{110} = \frac{148}{9}$$

Is this proportion true or false? Write one or more sentences discussing your decision.

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Activity 4-B

Ratio and Proportion

Be A Bargain Shopper!

In each row, write A if the first item is the better bargain or B if the second item is the better bargain. Be sure to explain your reasoning. Round to the nearest cent, if necessary.

	FIRST ITEM A	SECOND ITEM B	RESPONSE
1	50 CD's for $8.29	10 CD's for $2	
2	12 pack of soda for $2.99	$5.75 for 25 cans of soda	
3	3 pounds of ground beef for $4.47	$1.47/pound of ground beef	
4	10.2 ounce package of candy for $2.50	6 ounce candy bar $0.99	
5	2 pack of light bulbs (no special) for $0.44	4 pack of light bulbs for $1.99 Special: Buy 1 pack get 1 pack free!	
6	2-6 ounce tubes of toothpaste for $4	1-10 ounce tube of toothpaste for $2.99	
7	38 ounce bottle of mouthwash for $1.89	2-12 ounce bottles of mouthwash for $1.29	
8	Package of 20 Cold & Sinus Medication for $6.40	2 packages of 15 tablets each for $4.80/package	

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Activity 5-A

Percent

What's Missing?

Write a complete sentence to provide the additional piece(s) of information needed to solve each problem. Finally, solve the problem. Answers will vary.

Example: The price of a DVD decreased 10%. What was the new price?
Answer: *The original price of the DVD was $20.00. Solution: $18.00*

1. Geraldo purchased a sweatshirt and paid $1.50 in sales tax. What was the rate of tax?

2. A store was offering a discount on CDs listed at $19.00. What was the sale price of the CDs?

3. In a music store containing New Age and Pop CD's, 32% of the CDs are New Age. How many Pop CDs are in the store?

4. Jackie can burn CD's at the rate of 6 tracks per minute. How long will it take him to copy his CD collection?

5. On an average day, 72% of the people entering an eyeglass shop purchase at least one pair of eyeglasses. How many people purchased eyeglasses yesterday?

Extra: Select any problem on this page and explain why you feel the information you provided was necessary to complete the problem.

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Activity 5-B

Percent

Comparing Percents

In each row, write A if the first item is greater, B if the second item is greater, C if they are equal, and D if there's not enough information to decide.

	FIRST ITEM	SECOND ITEM	RESPONSE
1	25% of 178	¼ of 178	
2	The cost of a $125 radio at 10% off	The cost of a $125 radio at $12 off	
3	15½% of 30	2.5	
4	25% of 75	75% of 25	
5	50% of 350	5% of 35	
6	10% of 250 + 10% of 250	20% of 250	
7	$200 increased by 20%	$220 decreased by 20%	
8	350% of 8	0.35 × 8	

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