

***Beginning and Intermediate Algebra 6th edition
Tobey Solutions Manual***

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INSTRUCTOR SOLUTIONS MANUAL

BEGINNING AND INTERMEDIATE ALGEBRA SIXTH EDITION

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Chapter 0

0.1 Exercises

2. $\frac{13}{17}$: 17 is the denominator

4. $1\frac{3}{3}$ or $\frac{17}{17}$

6. $3\frac{3}{4}$



8. $\frac{20}{24} = \frac{5 \times 4}{6 \times 4} = \frac{5}{6}$

10. $\frac{8}{48} = \frac{1 \times 8}{6 \times 8} = \frac{1}{6}$

12. $\frac{72}{18} = \frac{18 \times 4}{18 \times 1} = 4$

14. $\frac{30}{85} = \frac{5 \times 6}{5 \times 17} = \frac{6}{17}$

16. $\frac{33}{55} = \frac{11 \times 3}{11 \times 5} = \frac{3}{5}$

18. $\frac{63}{9} = \frac{9 \times 7}{9 \times 1} = \frac{7}{1} = 7$

20. $\frac{19}{5} = 5\frac{4}{5}$

22. $\frac{54}{7} = 7\frac{5}{7}$

24. $\frac{41}{6} = 6\frac{5}{6}$

26. $\frac{25}{3} = 3\frac{8}{3}$

28. $\frac{79}{7} = 7\frac{11}{7}$

30. $\frac{124}{8} = 8\frac{15}{8} = 15\frac{4}{8} = 15\frac{1}{2}$

32. $4\frac{2}{5} = \frac{(4 \times 5) + 2}{5} = \frac{20 + 2}{5} = \frac{22}{5}$

34. $5\frac{1}{12} = \frac{(5 \times 12) + 1}{12} = \frac{60 + 1}{12} = \frac{61}{12}$

36. $1\frac{5}{6} = \frac{(1 \times 6) + 5}{6} = \frac{6 + 5}{6} = \frac{11}{6}$

38. $6\frac{2}{3} = \frac{(6 \times 3) + 2}{3} = \frac{18 + 2}{3} = \frac{20}{3}$

40. $10\frac{1}{9} = \frac{(10 \times 9) + 1}{9} = \frac{90 + 1}{9} = \frac{91}{9}$

42. $\frac{78}{6} = 78 \div 6$

$\frac{13}{6}$

$\frac{78}{6} = 13$

$$44. \frac{5}{9} = \frac{?}{54} \Rightarrow \frac{5 \times 6}{9 \times 6} = \frac{30}{54}$$

$$46. \frac{5}{9} = \frac{?}{45} \Rightarrow \frac{5 \times 5}{9 \times 5} = \frac{25}{45}$$

$$48. \frac{13}{17} = \frac{?}{51} \Rightarrow \frac{13 \times 3}{17 \times 3} = \frac{39}{51}$$

$$50. \frac{10}{15} = \frac{?}{60} \Rightarrow \frac{10 \times 4}{15 \times 4} = \frac{40}{60}$$

$$52. \frac{7}{8} = \frac{?}{40} \Rightarrow \frac{7 \times 5}{8 \times 5} = \frac{35}{40}$$

$$54. \frac{45}{50} = \frac{?}{100} \Rightarrow \frac{45 \times 2}{50 \times 2} = \frac{90}{100}$$

$$56. \frac{20}{424} = \frac{5 \times 4}{106 \times 4} = \frac{5}{106}$$

$$58. \frac{1400}{2420} = \frac{70 \times 20}{121 \times 20} = \frac{70}{121}$$

$$60. \frac{3}{1+3+1} = \frac{3}{5} \text{ is raisins}$$

$$62. \frac{1+3}{1+3+1} = \frac{4}{5} \text{ does not contain nuts}$$

$$64. \frac{6}{6+8} = \frac{6}{14} = \frac{3 \times 2}{7 \times 2} = \frac{3}{7}$$

$\frac{3}{7}$ of the students enrolled in 1994 were male.

Classroom Quiz 0.1

$$1. \frac{56}{88} = \frac{7 \times 8}{11 \times 8} = \frac{7}{11}$$

$$2. 5 \frac{11}{14} \Rightarrow \frac{(5 \times 14) + 11}{14} = \frac{70 + 11}{14} = \frac{81}{14}$$

$$3. \frac{109}{12} = 9 \frac{1}{12}$$

$$\begin{array}{r} 9 \\ 12 \overline{)109} \\ \underline{108} \\ 1 \end{array}$$

0.2 Exercises

2. You must change the fractions to equivalent fractions with a common denominator.

$$4. \frac{21}{30} \text{ and } \frac{17}{20}$$

$$30 = 2 \cdot 3 \cdot 5$$

$$20 = 2 \cdot 2 \cdot 5$$

$$\text{LCD} = 2 \cdot 2 \cdot 3 \cdot 5 = 60$$

$$6. \frac{5}{18} \text{ and } \frac{1}{24}$$

$$18 = 2 \cdot 3 \cdot 3$$

$$24 = 2 \cdot 2 \cdot 2 \cdot 3$$

$$\text{LCD} = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 = 72$$

$$8. \frac{5}{16} \text{ and } \frac{7}{48}$$

$$16 = 2 \cdot 2 \cdot 2 \cdot 2$$

$$48 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3$$

$$\text{LCD} = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 = 48$$

$$10. \frac{11}{12} \text{ and } \frac{7}{20}$$

$$12 = 2 \cdot 2 \cdot 3$$

$$20 = 2 \cdot 2 \cdot 5$$

$$\text{LCD} = 2 \cdot 2 \cdot 3 \cdot 5 = 60$$

$$12. \frac{7}{30} \text{ and } \frac{8}{45}$$

$$30 = 2 \cdot 3 \cdot 5$$

$$45 = 3 \cdot 3 \cdot 5$$

$$\text{LCD} = 2 \cdot 3 \cdot 3 \cdot 5 = 90$$

$$14. \frac{1}{7}, \frac{3}{14}, \text{ and } \frac{9}{35}$$

$$7 = 7$$

$$14 = 2 \cdot 7$$

$$35 = 5 \cdot 7$$

$$\text{LCD} = 2 \cdot 5 \cdot 7 = 70$$

$$16. \frac{3}{8}, \frac{5}{12}, \text{ and } \frac{11}{42}$$

$$8 = 2 \cdot 2 \cdot 2$$

$$12 = 2 \cdot 2 \cdot 3$$

$$42 = 2 \cdot 3 \cdot 7$$

$$\text{LCD} = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 7 = 168$$

$$18. \frac{5}{8}, \frac{3}{14} \text{ and } \frac{11}{16}$$

$$8 = 2 \cdot 2 \cdot 2$$

$$14 = 2 \cdot 7$$

$$16 = 2 \cdot 2 \cdot 2 \cdot 2$$

$$\text{LCD} = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 7 = 112$$

$$20. \frac{3}{11} + \frac{5}{11} = \frac{3+5}{11} = \frac{8}{11}$$

$$22. \frac{11}{15} - \frac{2}{15} = \frac{11-2}{15} = \frac{9}{15} = \frac{3}{5}$$

$$24. \frac{3}{20} + \frac{13}{15} = \frac{3 \times 3}{20 \times 3} + \frac{13 \times 4}{15 \times 4} = \frac{9}{60} + \frac{52}{60} = \frac{61}{60} \text{ or } 1 \frac{1}{60}$$

$$26. \frac{4}{5} - \frac{3}{7} = \frac{4 \times 7}{5 \times 7} - \frac{3 \times 5}{7 \times 5} = \frac{28}{35} - \frac{15}{35} = \frac{13}{35}$$

$$28. \frac{3}{8} + \frac{1}{3} = \frac{3 \times 3}{8 \times 3} + \frac{1 \times 8}{3 \times 8} = \frac{9}{24} + \frac{8}{24} = \frac{17}{24}$$

$$30. \frac{2}{15} + \frac{7}{10} = \frac{2 \times 2}{15 \times 2} + \frac{7 \times 3}{10 \times 3} = \frac{4}{30} + \frac{21}{30} = \frac{25}{30} = \frac{5}{6}$$

$$32. \frac{21}{12} - \frac{23}{24} = \frac{21 \times 2}{12 \times 2} - \frac{23}{24} = \frac{42}{24} - \frac{23}{24} = \frac{19}{24}$$

$$34. \frac{13}{15} - \frac{1}{5} = \frac{13}{15} - \frac{1 \times 3}{5 \times 3} = \frac{13}{15} - \frac{3}{15} = \frac{10}{15} = \frac{2}{3}$$

$$36. \frac{7}{4} + \frac{5}{9} = \frac{7 \times 9}{4 \times 9} + \frac{5 \times 4}{9 \times 4} = \frac{63}{36} + \frac{20}{36} = \frac{83}{36} \text{ or } 2 \frac{11}{36}$$

$$38. \frac{4}{7} + \frac{7}{9} + \frac{1}{3} = \frac{36}{63} + \frac{49}{63} + \frac{21}{63} = \frac{106}{63} \text{ or } 1 \frac{43}{63}$$

$$40. \frac{1}{12} + \frac{3}{14} + \frac{4}{21} = \frac{1 \times 7}{12 \times 7} + \frac{3 \times 6}{14 \times 6} + \frac{4 \times 4}{21 \times 4} \\ = \frac{7}{84} + \frac{18}{84} + \frac{16}{84} \\ = \frac{41}{84}$$

$$42. \frac{1}{5} + \frac{2}{3} - \frac{11}{15} = \frac{1 \times 3}{5 \times 3} + \frac{2 \times 5}{3 \times 5} - \frac{11}{15} \\ = \frac{3}{15} + \frac{10}{15} - \frac{11}{15} \\ = \frac{2}{15}$$

$$44. \frac{5}{24} + \frac{3}{8} - \frac{1}{3} = \frac{5}{24} + \frac{9}{24} - \frac{8}{24} = \frac{6}{24} = \frac{1}{4}$$

$$46. 3\frac{1}{8} + 2\frac{1}{6} = \frac{25}{8} + \frac{13}{6} = \frac{75}{24} + \frac{52}{24} = \frac{127}{24} = 5\frac{7}{24}$$

$$48. 6\frac{2}{3} + \frac{3}{4} = \frac{20}{3} + \frac{3}{4} = \frac{80}{12} + \frac{9}{12} = \frac{89}{12} = 7\frac{5}{12}$$

$$50. 7\frac{2}{5} - 3\frac{3}{4} = \frac{37}{5} - \frac{15}{4} = \frac{148}{20} - \frac{75}{20} = \frac{73}{20} = 3\frac{13}{20}$$

$$52. 7\frac{8}{15} - 2\frac{3}{5} = \frac{113}{15} - \frac{13}{5} = \frac{113}{15} - \frac{39}{15} = \frac{74}{15} = 4\frac{14}{15}$$

$$54. 3\frac{1}{7} + 4\frac{1}{3} = \frac{22}{7} + \frac{13}{3} = \frac{66}{21} + \frac{91}{21} = \frac{157}{21} = 7\frac{10}{21}$$

$$56. 12\frac{1}{3} - 5\frac{2}{3} = \frac{37}{3} - \frac{17}{3} = \frac{20}{3} = 6\frac{2}{3}$$

$$58. 9\frac{12}{13} + 9\frac{1}{13} = \frac{129}{13} + \frac{118}{13} = \frac{247}{13} = 19$$

$$60. \frac{19}{30} + \frac{3}{10} = \frac{19}{30} + \frac{9}{30} = \frac{28}{30} = \frac{14}{15}$$

$$62. 5\frac{2}{3} + 7\frac{2}{5} = \frac{17}{3} + \frac{37}{5} = \frac{85}{15} + \frac{111}{15} = \frac{196}{15} = 13\frac{1}{15}$$

$$64. \frac{15}{24} - \frac{3}{8} = \frac{15}{24} - \frac{9}{24} = \frac{6}{24} = \frac{1}{4}$$

$$66. 6\frac{1}{3} - 4\frac{1}{4} = \frac{19}{3} - \frac{17}{4} = \frac{76}{12} - \frac{51}{12} = \frac{25}{12} = 2\frac{1}{12}$$

$$68. \frac{3}{8} - \frac{1}{8} = \frac{2}{8} = \frac{1}{4}$$

$$70. 1\frac{2}{3} + \frac{5}{18} = \frac{5}{3} + \frac{5}{18} = \frac{30}{18} + \frac{5}{18} = \frac{35}{18} = 1\frac{17}{18}$$

$$72. \frac{3}{15} + \frac{2}{15} = \frac{5}{15} = \frac{1}{3}$$

$$74. 28 - 3\frac{5}{8} = \frac{28}{1} - \frac{29}{8} = \frac{224}{8} - \frac{29}{8} = \frac{195}{8} = 24\frac{3}{8}$$

$$\begin{aligned}
 76. \quad 10\frac{1}{2} + 5\frac{1}{4} + 18\frac{2}{3} &= \frac{21}{2} + \frac{21}{4} + \frac{56}{3} \\
 &= \frac{126}{12} + \frac{63}{12} + \frac{224}{12} \\
 &= \frac{413}{12} \\
 &= 34\frac{5}{12}
 \end{aligned}$$

They ran a total of $34\frac{5}{12}$ miles.

$$\begin{aligned}
 78. \quad 17\frac{3}{4} + 1\frac{1}{4} - 2\frac{2}{3} &= \frac{71}{4} + \frac{5}{4} - \frac{8}{3} \\
 &= \frac{213}{12} + \frac{15}{12} - \frac{32}{12} \\
 &= \frac{196}{12} \\
 &= 16\frac{4}{12} \\
 &= 16\frac{1}{3}
 \end{aligned}$$

There are now $16\frac{1}{3}$ gallons.

$$80. \quad 4\frac{5}{8} - 4\frac{9}{16} = \frac{37}{8} - \frac{73}{16} = \frac{74}{16} - \frac{73}{16} = \frac{1}{16} \text{ inch}$$

It is smaller so it will slide in and out easily.

$$82. \quad 2\frac{1}{2} + \frac{1}{16} = \frac{5}{2} + \frac{1}{16} = \frac{40}{16} + \frac{1}{16} = \frac{41}{16} = 2\frac{9}{16}$$

The fairway grass could be as long as

$2\frac{9}{16}$ inches.

$$\frac{7}{8} - \frac{1}{16} = \frac{14}{16} - \frac{1}{16} = \frac{13}{16}$$

The putting greens could be as short as $\frac{13}{16}$ inch.

Cumulative Review

$$83. \quad \frac{36}{44} = \frac{9 \times 4}{1 \times 4} = \frac{9}{11}$$

$$84. \quad 26\frac{3}{5} = \frac{26 \times 5 + 3}{5} = \frac{133}{5}$$

Classroom Quiz 0.2

$$1. \quad \frac{1}{6} + \frac{2}{3} + \frac{3}{8} = \frac{4}{24} + \frac{16}{24} + \frac{9}{24} = \frac{29}{24} \text{ or } 1\frac{5}{24}$$

$$\begin{aligned}
 2. \quad 2\frac{17}{18} + 4\frac{5}{9} &= \frac{53}{18} + \frac{41}{9} \\
 &= \frac{53}{18} + \frac{82}{18} \\
 &= \frac{135}{18} \\
 &= 7\frac{9}{18} \\
 &= 7\frac{1}{2}
 \end{aligned}$$

$$3. \quad 7\frac{2}{5} - 3\frac{2}{3} = \frac{37}{5} - \frac{11}{3} = \frac{111}{15} - \frac{55}{15} = \frac{56}{15} = 3\frac{11}{15}$$

0.3 Exercises

2. Invert the second fraction. Multiply the result by the first fraction.

$$4. \quad \frac{5}{7} \times \frac{28}{15} = \frac{5}{7} \times \frac{7 \cdot 4}{5 \cdot 3} = \frac{4}{3} \text{ or } 1\frac{1}{3}$$

$$6. \quad \frac{17}{26} \times \frac{13}{34} = \frac{17}{2 \cdot 13} \times \frac{13}{17 \cdot 2} = \frac{1}{4}$$

$$8. \quad \frac{3}{11} \times \frac{5}{7} = \frac{15}{77}$$

$$10. \quad \frac{15}{24} \times \frac{8}{9} = \frac{3 \cdot 5}{3 \cdot 8} \times \frac{8}{3 \cdot 3} = \frac{5}{9}$$

$$12. \quad \frac{6}{21} \times \frac{9}{18} = \frac{2 \cdot 3}{3 \cdot 7} \times \frac{9}{2 \cdot 9} = \frac{1}{7}$$

$$14. \quad \frac{2}{21} \times 15 = \frac{2}{3 \cdot 7} \times \frac{3 \cdot 5}{1} = \frac{10}{7} \text{ or } 1\frac{3}{7}$$

$$16. \quad \frac{8}{11} \times 3 = \frac{8}{11} \times \frac{3}{1} = \frac{24}{11} \text{ or } 2\frac{2}{11}$$

$$18. \quad \frac{13}{9} \div \frac{13}{7} = \frac{13}{9} \times \frac{7}{13} = \frac{7}{9}$$

$$20. \quad \frac{7}{8} \div 4 = \frac{7}{8} \times \frac{1}{4} = \frac{7}{32}$$

$$22. \quad 18 \div \frac{2}{9} = \frac{18}{1} \times \frac{9}{2} = \frac{9}{1} \times \frac{9}{1} = 81$$

$$24. \frac{8}{12} \div \frac{5}{6} = \frac{8}{12} \times \frac{6}{5} = \frac{2 \cdot 4}{2 \cdot 6} \times \frac{6}{5} = \frac{4}{5}$$

$$26. \frac{9}{28} \div \frac{4}{7} = \frac{9}{28} \times \frac{7}{4} = \frac{9}{4 \cdot 7} \times \frac{7}{4} = \frac{9}{16}$$

$$28. \frac{\frac{5}{6}}{\frac{10}{13}} = \frac{5}{6} \div \frac{10}{13} = \frac{5}{6} \times \frac{13}{10} = \frac{5 \times 13}{6 \times 2 \times 5} = \frac{13}{12} = 1 \frac{1}{12}$$

$$30. \frac{\frac{3}{4}}{\frac{11}{12}} = \frac{3}{4} \div \frac{11}{12} = \frac{3}{4} \times \frac{12}{11} = \frac{3 \times 3 \times 4}{4 \times 11} = \frac{9}{11}$$

$$32. 4 \frac{1}{2} \div 3 \frac{3}{8} = \frac{9}{2} \div \frac{27}{8} = \frac{9}{2} \times \frac{8}{27} = \frac{4}{3} = 1 \frac{1}{3}$$

$$34. 5 \frac{1}{2} \div 3 \frac{3}{4} = \frac{11}{2} \div \frac{15}{4} \\ = \frac{11}{2} \times \frac{4}{15} \\ = \frac{11}{2} \times \frac{2 \times 2}{15} \\ = \frac{22}{15} \\ = 1 \frac{7}{15}$$

$$36. \frac{1}{4} \div 1 \frac{7}{8} = \frac{1}{4} \div \frac{15}{8} = \frac{1}{4} \times \frac{8}{15} = \frac{1}{4} \times \frac{2 \cdot 4}{15} = \frac{2}{15}$$

$$38. \frac{18}{4 \frac{1}{2}} = 18 \div 4 \frac{1}{2} = \frac{18}{1} \div \frac{9}{2} = \frac{18}{1} \times \frac{2}{9} = \frac{9 \cdot 2}{1} \times \frac{2}{9} = 4$$

$$40. \frac{\frac{5}{6}}{2 \frac{1}{2}} = \frac{5}{6} \div 2 \frac{1}{2} = \frac{5}{6} \div \frac{5}{2} = \frac{5}{6} \times \frac{2}{5} = \frac{5}{3 \cdot 2} \times \frac{2}{5} = \frac{1}{3}$$

$$42. \frac{12}{18} \times \frac{9}{2} = \frac{6 \cdot 2}{6 \cdot 3} \times \frac{3 \cdot 3}{2} = 3$$

$$44. \frac{5}{6} \div \frac{11}{18} = \frac{5}{6} \times \frac{18}{11} = \frac{5}{6} \times \frac{3 \cdot 6}{11} = \frac{15}{11} \text{ or } 1 \frac{4}{11}$$

$$46. 10 \frac{2}{9} \div 2 \frac{1}{3} = \frac{92}{9} \div \frac{7}{3} \\ = \frac{92}{9} \times \frac{3}{7} \\ = \frac{92}{3} \times \frac{1}{7} \\ = \frac{92}{21} \\ = 4 \frac{8}{21}$$

$$48. 15 \div 1 \frac{2}{3} = \frac{15}{1} \div \frac{5}{3} = \frac{15}{1} \times \frac{3}{5} = \frac{5 \cdot 3}{1} \times \frac{3}{5} = 9$$

$$50. 6 \frac{1}{2} \times 12 = \frac{13}{2} \times \frac{2 \cdot 6}{1} = 78$$

$$52. 2 \frac{1}{3} \times \frac{2}{3} \times \frac{3}{5} = \frac{7}{3} \times \frac{2}{3} \times \frac{3}{5} = \frac{7 \cdot 2}{3 \cdot 5} = \frac{14}{15}$$

$$54. \text{ a. } \frac{1}{6} \times \frac{24}{15} = \frac{1}{6} \times \frac{4 \cdot 6}{15} = \frac{4}{15}$$

$$\text{ b. } \frac{1}{6} \div \frac{24}{15} = \frac{1}{6} \times \frac{15}{24} = \frac{1}{2 \cdot 3} \times \frac{3 \cdot 5}{24} = \frac{5}{48}$$

$$56. \text{ a. } \frac{3}{7} \div \frac{21}{25} = \frac{3}{7} \times \frac{25}{21} = \frac{3}{7} \times \frac{25}{3 \cdot 7} = \frac{25}{49}$$

$$\text{ b. } \frac{3}{7} \times \frac{21}{25} = \frac{3}{7} \times \frac{3 \cdot 7}{25} = \frac{9}{25}$$

$$58. 29 \frac{1}{4} \div 1 \frac{5}{8} = \frac{117}{4} \div \frac{13}{8} \\ = \frac{117}{4} \times \frac{8}{13} \\ = \frac{9 \cdot 13}{4} \times \frac{2 \cdot 4}{13} \\ = 18$$

The material can make 18 pullovers.

$$60. 15 \times 10 \frac{1}{5} = \frac{15}{1} \times \frac{51}{5} = \frac{3 \cdot 5}{1} \times \frac{51}{5} = 153$$

The area of her garden is 153 square feet.

Cumulative Review

$$61. \frac{11}{15} = \frac{?}{75} \Rightarrow \frac{11 \times 5}{15 \times 5} = \frac{55}{75}$$

$$62. \frac{7}{9} = \frac{?}{63} \Rightarrow \frac{7 \times 7}{9 \times 7} = \frac{49}{63}$$

Classroom Quiz 0.3

$$1. \frac{4}{13} \times \frac{26}{29} = \frac{4}{13} \times \frac{13 \cdot 2}{29} = \frac{8}{29}$$

$$2. 5\frac{1}{2} \times 2\frac{5}{6} = \frac{11}{2} \times \frac{17}{6} = \frac{187}{12} = 15\frac{7}{12}$$

$$3. 1\frac{3}{7} \div 2\frac{1}{14} = \frac{10}{7} \div \frac{29}{14} = \frac{10}{7} \times \frac{14}{29} = \frac{10}{7} \times \frac{7 \cdot 2}{29} = \frac{20}{29}$$

0.4 Exercises

2. We write 0.42 in words as forty-two hundredths.

4. When dividing 96.3 by 10,000 we move the decimal point 4 places to the left.

$$6. \frac{18}{25} = 25 \overline{)18.00} = 0.72$$

$$\begin{array}{r} 0.72 \\ 25 \overline{)18.00} \\ \underline{17 \ 5} \\ 50 \\ \underline{50} \\ 0 \end{array}$$

$$8. \frac{9}{15} = 15 \overline{)9.0} = 0.6$$

$$\begin{array}{r} 0.6 \\ 15 \overline{)9.0} \\ \underline{9 \ 0} \\ 0 \end{array}$$

$$10. \frac{1}{6} = 6 \overline{)1.000} = 0.1\bar{6}$$

$$\begin{array}{r} 0.166 \\ 6 \overline{)1.000} \\ \underline{6} \\ 40 \\ \underline{36} \\ 40 \\ \underline{36} \\ 4 \end{array}$$

$$12. 0.5 = \frac{5}{10} = \frac{1}{2}$$

$$14. 0.35 = \frac{35}{100} = \frac{7}{20}$$

$$16. 0.775 = \frac{775}{1000} = \frac{31 \times 25}{40 \times 25} = \frac{31}{40}$$

$$18. 0.08 = \frac{8}{100} = \frac{2}{25}$$

$$20. 4.8 = \frac{48}{10} = \frac{24 \times 2}{5 \times 2} = \frac{24}{5} \text{ or } 4\frac{4}{5}$$

$$22. 6.25 = \frac{625}{1000} = \frac{25 \times 25}{4 \times 25} = \frac{25}{4} \text{ or } 6\frac{1}{4}$$

$$24. \begin{array}{r} 4.64 \\ + 0.23 \\ \hline 4.87 \end{array}$$

$$26. \begin{array}{r} 6.31 \\ 4.20 \\ + 8.50 \\ \hline 19.01 \end{array}$$

$$28. \begin{array}{r} 33.010 \\ 0.380 \\ + 175.401 \\ \hline 208.791 \end{array}$$

$$30. \begin{array}{r} 121.52 \\ - 79.85 \\ \hline 41.67 \end{array}$$

$$32. \begin{array}{r} 5.0032 \\ - 3.0036 \\ \hline 1.9996 \end{array}$$

$$34. \begin{array}{r} 212.54 \\ - 3.60 \\ \hline 208.94 \end{array}$$

$$36. \begin{array}{r} 6.12 \\ \times 3.4 \\ \hline 2 \ 448 \\ 18 \ 36 \\ \hline 20.808 \end{array}$$

$$38. \begin{array}{r} 6.32 \\ \times 1.31 \\ \hline 632 \\ 1 \ 896 \\ 6 \ 32 \\ \hline 8.2792 \end{array}$$

$$\begin{array}{r}
 40. \quad 3.84 \\
 \times 0.0017 \\
 \hline
 2688 \\
 384 \\
 \hline
 0.006528
 \end{array}$$

$$\begin{array}{r}
 42. \quad 23,000 \\
 \times 0.0042 \\
 \hline
 4\ 6000 \\
 92\ 000 \\
 \hline
 96.6000 \\
 \text{or } 96.6
 \end{array}$$

$$\begin{array}{r}
 44. \quad \begin{array}{r} 0.3248 \\ 39 \overline{)12.6672} \\ \underline{11\ 7} \\ 96 \\ \underline{78} \\ 187 \\ \underline{156} \\ 312 \\ \underline{312} \\ 0 \end{array}
 \end{array}$$

$$\begin{array}{r}
 46. \quad \begin{array}{r} 3.18 \\ 2.05 \wedge \overline{)6.51 \wedge 90} \\ \underline{6\ 15} \\ 36\ 9 \\ \underline{20\ 5} \\ 16\ 40 \\ \underline{16\ 40} \\ 0 \end{array}
 \end{array}$$

$$\begin{array}{r}
 48. \quad \begin{array}{r} 6.2 \\ 0.005 \wedge \overline{)0.031 \wedge 0} \\ \underline{30} \\ 1\ 0 \\ \underline{1\ 0} \\ 0 \end{array}
 \end{array}$$

$$\begin{array}{r}
 50. \quad \begin{array}{r} 0.095 \\ 0.09 \wedge \overline{)0.00 \wedge 855} \\ \underline{81} \\ 45 \\ \underline{45} \\ 0 \end{array}
 \end{array}$$

$$52. \quad 1.36 \times 1000 = 1360$$

$$54. \quad 175,318 \div 1000 = 175.318$$

$$56. \quad 0.00243 \times 100,000 = 243$$

$$58. \quad 3.52 \div 1000 = 0.00352$$

$$60. \quad 85.54 \times 10,000 = 855,400$$

$$62. \quad 96.12 \div 10,000 = 0.009612$$

$$\begin{array}{r}
 64. \quad 8.252 \\
 \times 0.005 \\
 \hline
 0.041260 \text{ or } 0.04126
 \end{array}$$

$$\begin{array}{r}
 66. \quad 1.109 \\
 0.088 \\
 + 16.4 \\
 \hline
 17.597
 \end{array}$$

$$\begin{array}{r}
 68. \quad \begin{array}{r} 25712. \text{ or } 25,712 \\ 0.003 \wedge \overline{)77.136 \wedge} \\ \underline{6} \\ 17 \\ \underline{15} \\ 2\ 1 \\ \underline{2\ 1} \\ 3 \\ \underline{3} \\ 6 \\ \underline{6} \\ 0 \end{array}
 \end{array}$$

$$70. \quad 25.62 \times 10,000 = 256,200$$

$$\begin{array}{r}
 72. \quad 14.30 \\
 - 0.68 \\
 \hline
 13.62
 \end{array}$$

$$74. \quad 0.58 \div 1000 = 0.00058$$

$$\begin{array}{r}
 76. \quad 13.2 \\
 \times 44 \\
 \hline
 52\ 8 \\
 528 \\
 \hline
 580.8
 \end{array}$$

Chris can drive 580.8 miles.

$$78. \quad 1.3 \times 5 = 6.5 \text{ milligrams}$$

No; there was 0.3 milligram of copper in the 5 liters (or 0.06 milligram per liter) in excess of the standard.

Cumulative Review

$$79. 3\frac{1}{2} \div 5\frac{1}{4} = \frac{7}{2} \div \frac{21}{4} = \frac{7}{2} \cdot \frac{4}{21} = \frac{1 \cdot 2}{1 \cdot 3} = \frac{2}{3}$$

$$80. \frac{3}{8} \cdot \frac{12}{27} = \frac{3}{2 \cdot 4} \cdot \frac{3 \cdot 4}{3 \cdot 3 \cdot 3} = \frac{1}{6}$$

$$81. \frac{12}{25} + \frac{9}{20} = \frac{48}{100} + \frac{45}{100} = \frac{48+45}{100} = \frac{93}{100}$$

$$82. 1\frac{3}{5} - \frac{1}{2} = \frac{8}{5} - \frac{1}{2} = \frac{16}{10} - \frac{5}{10} = \frac{16-5}{10} = \frac{11}{10} = 1\frac{1}{10}$$

Classroom Quiz 0.4

$$1. \begin{array}{r} 9.0038 \\ - 4.6329 \\ \hline 4.3709 \end{array}$$

$$2. \begin{array}{r} 47.9 \\ \times 0.07 \\ \hline 3.353 \end{array}$$

$$3. \begin{array}{r} 0.23 \overline{) 5.95} \wedge 7 \\ \underline{46} \\ 135 \\ \underline{115} \\ 207 \\ \underline{207} \\ 0 \end{array}$$

Use Math to Save Money

$$1. \$100, \$300, \$2000, \$8000, \$8000, \$8000, \$12,000$$

$$2. 3 \times \$25 + \$50 + \$200 + 2 \times \$20 \\ = \$75 + \$50 + \$200 + \$40 \\ = \$365$$

$$3. \text{The three smallest debts are \$100 loan, \$300 loan, and \$2000 car loan.}$$

$$4. \$20 \text{ each, or } \$40$$

$$5. \$2000 - \$400 = \$1600$$

$$\frac{\$1600}{\$240} \approx 7 \text{ (rounded to the nearest whole}$$

number)

It will take them 7 more months to pay off the third smallest debt.

6. Answers will vary.

How Am I Doing? Sections 0.1–0.4

(Available online through MyMathLab or from the Instructor's Resource Center.)

$$1. \frac{15}{55} = \frac{3 \cdot 5}{11 \cdot 5} = \frac{3}{11}$$

$$2. \frac{46}{115} = \frac{2 \cdot 23}{5 \cdot 23} = \frac{2}{5}$$

$$3. \frac{15}{4} = 4 \overline{) 15} = 3 \frac{3}{4}$$

$$4. 4\frac{5}{7} = \frac{4 \cdot 7 + 5}{7} = \frac{28+5}{7} = \frac{33}{7}$$

$$5. \frac{4}{5} = \frac{?}{30} \Rightarrow \frac{4 \times 6}{5 \times 6} = \frac{24}{30}$$

$$6. \frac{5}{9} = \frac{?}{81} \Rightarrow \frac{5 \times 9}{9 \times 9} = \frac{45}{81}$$

$$7. 8 = 2 \cdot 2 \cdot 2 \\ 6 = 2 \cdot 3 \\ 15 = 3 \cdot 5 \\ \text{LCD} = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 5 = 120$$

$$8. \frac{3}{7} + \frac{2}{7} = \frac{3+2}{7} = \frac{5}{7}$$

$$9. \frac{5}{14} + \frac{2}{21} = \frac{5 \cdot 3}{14 \cdot 3} + \frac{2 \cdot 2}{21 \cdot 2} = \frac{15}{42} + \frac{4}{42} = \frac{19}{42}$$

$$10. 2\frac{3}{4} + 5\frac{2}{3} = \frac{11}{4} + \frac{17}{3} \\ = \frac{11 \cdot 3}{4 \cdot 3} + \frac{17 \cdot 4}{3 \cdot 4} \\ = \frac{33}{12} + \frac{68}{12} \\ = \frac{101}{12} \\ = 8\frac{5}{12}$$

$$11. \frac{17}{18} - \frac{5}{9} = \frac{17}{18} - \frac{5 \cdot 2}{9 \cdot 2} = \frac{17}{18} - \frac{10}{18} = \frac{7}{18}$$

$$12. \frac{6}{7} - \frac{2}{3} = \frac{6 \cdot 3}{7 \cdot 3} - \frac{2 \cdot 7}{3 \cdot 7} = \frac{18}{21} - \frac{14}{21} = \frac{4}{21}$$

$$13. \begin{aligned} 3\frac{1}{5} - 1\frac{3}{8} &= \frac{16}{5} - \frac{11}{8} \\ &= \frac{16 \cdot 8}{5 \cdot 8} - \frac{11 \cdot 5}{8 \cdot 5} \\ &= \frac{128}{40} - \frac{55}{40} \\ &= \frac{73}{40} \\ &= 1\frac{33}{40} \end{aligned}$$

$$14. \frac{25}{7} \times \frac{14}{45} = \frac{5 \cdot 5}{7} \times \frac{2 \cdot 7}{5 \cdot 9} = \frac{10}{9} = 1\frac{1}{9}$$

$$15. 12 \times 3\frac{1}{2} = \frac{12}{1} \times \frac{7}{2} = \frac{6 \cdot 2}{1} \times \frac{7}{2} = 42$$

$$16. 4 \div \frac{8}{7} = \frac{4}{1} \cdot \frac{7}{8} = \frac{4}{1} \times \frac{7}{2 \cdot 4} = \frac{7}{2} = 3\frac{1}{2}$$

$$17. 2\frac{1}{3} \div 3\frac{1}{4} = \frac{7}{3} \div \frac{13}{4} = \frac{7}{3} \times \frac{4}{13} = \frac{28}{39}$$

$$18. \begin{array}{r} \frac{3}{8} = 8 \overline{) 3.000} = 0.375 \\ \underline{24} \\ 60 \\ \underline{56} \\ 40 \\ \underline{40} \\ 0 \end{array}$$

$$19. \begin{array}{r} \frac{5}{6} = 6 \overline{) 5.000} = 0.8\bar{3} \\ \underline{48} \\ 20 \\ \underline{18} \\ 20 \\ \underline{18} \\ 2 \end{array}$$

$$20. \begin{array}{r} \frac{3}{200} = 200 \overline{) 3.000} = 0.015 \\ \underline{200} \\ 1000 \\ \underline{1000} \\ 0 \end{array}$$

$$21. \begin{array}{r} 15.230 \\ 3.600 \\ + 0.821 \\ \hline 19.651 \end{array}$$

$$22. \begin{array}{r} 3.28 \\ \times 0.63 \\ \hline 984 \\ 1968 \\ \hline 2.0664 \end{array}$$

$$23. \begin{array}{r} \frac{3.015}{6.7} = 6.7 \overline{) 3.0 \wedge 15} = 0.45 \\ \underline{268} \\ 335 \\ \underline{335} \\ 0 \end{array}$$

$$24. \begin{array}{r} 12.130 \\ - 9.884 \\ \hline 2.246 \end{array}$$

0.5 Exercises

2. The number directly following the word “of” should be the denominator. In this case you should use $\frac{30}{80}$ since 80 follows the word “of.”

4. $0.54 = 54\%$

6. $0.063 = 6.3\%$

8. $0.046 = 4.6\%$

10. $7.49 = 749\%$

12. $5.7 = 570\%$

14. $8.674 = 867.4\%$

16. $6\% = 0.06$

18. $0.62\% = 0.0062$

20. $175\% = 1.75$

22. $8.7\% = 0.087$

24. $0.1\% = 0.001$

26. $200\% = 2.00$ or 2

28. 7% of 69
 $0.07 \times 69 = 4.83$

30. 25% of 600
 $0.25 \times 600 = 150$

32. 154% of 270
 $1.54 \times 270 = 415.8$

34. 49 is what percent of 28?
 $\frac{49}{28} = 1.75 = 175\%$

36. What percent of 35 is 28?
 $\frac{28}{35} = \frac{4}{5} = 0.8 = 80\%$

38. 48 is what percent of 600?
 $\frac{48}{600} = \frac{2}{25} = 0.08 = 8\%$

40. 75 is what percent of 30?
 $\frac{75}{30} = \frac{5}{2} = 2.5 = 250\%$

42. What percent of 440 is 11?
 $\frac{11}{440} = 0.025 = 2.5\%$
2.5% of the units were defective.

44. 28% of 350
 $0.28 \times 350 = 98$
98 of the new businesses failed.

46. $\frac{137}{180} \approx 0.7611 = 76.11\%$
About 76.11% had a grandparent not born in the United States.

48. $17\% \times 3690 = 0.17 \times 3690 = 627.30$
Her monthly cost is \$627.30.

50. a. $65\% \times 18,600 = 12,090$
He traveled 12,090 miles.

b. $0.31 \times 12,090 = 3747.90$
He was paid \$3747.90.

52. $729 \times 688 \approx 700 \times 700 = 490,000$

54. $8192 \times 5984 \approx 8000 \times 6000 = 48,000,000$

56. $318 + 494 + 613 + 243 \approx 300 + 500 + 600 + 200 = 1600$

58. $16 \overline{)5,846,213} \approx 20 \overline{)6,000,000} \frac{300,000}{}$

60. $\frac{53,610}{786} \approx \frac{50,000}{800} = \frac{500}{8} = 62.5$

62. $4.9\% \text{ of } \$9321.88 \approx 0.05 \times \$9000 = \$450$

64. $85 \times 19 \times 5 \approx 90 \times 20 \times 5 = 9000$
An estimated \$9000 is withdrawn each hour.

66. $\frac{11,900}{430} \approx \frac{10,000}{400} = 25$
It will take an estimated 25 trips.

Cumulative Review

67. Distance: $69,229.5 - 68,459.5 = 770$
 $\frac{770}{35} = 22$
His car achieved 22 miles per gallon.

68. Total = $4.6 + 4.5 + 2.9 = 12$
Average = $\frac{12}{3} = 4.0$ inches per month.

Classroom Quiz 0.5

1. $6.4\% \text{ of } 380 = 0.064 \times 380 = 24.32$

2. 247 is what percent of 380?
 $\frac{247}{380} = 0.65 = 65\%$

3. $4498.56 \times 6721.18 \approx 4000 \times 7000 \approx 28,000,000$

0.6 Exercises

2. Area = $22 \frac{1}{2} \times 12 \frac{1}{2} = \frac{45}{2} \times \frac{25}{2} = \frac{1125}{4}$

Cost = $8.00 \times \frac{1125}{4} = 2250$

The total cost is \$2250.

$$\begin{aligned}
 4. \quad a. \quad 12\frac{1}{2} \times 20\frac{1}{2} \times 5 &= \frac{25}{2} \times \frac{41}{2} \times \frac{5}{1} \\
 &= \frac{5125}{4} \\
 &= 1281.25 \\
 &\approx 1281
 \end{aligned}$$

It will take 1281 cubic feet to fill the pool.

$$\begin{aligned}
 b. \quad 1281 \text{ cu ft} \times \frac{7.5 \text{ gal}}{\text{cu ft}} &= 9607.5 \text{ gal} \\
 &\approx 10,000 \text{ gal}
 \end{aligned}$$

The pool holds 10,000 gallons.

$$c. \quad \frac{10,000}{5000} = 2; 2 \times 4 = 8$$

They should add 8 ounces of chlorinator each day.

6. Increase from day 1 to day 3

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

$$\text{Jog: } \frac{5}{3} \times 1\frac{1}{2} = \frac{5}{3} \times \frac{3}{2} = 2\frac{1}{2} \text{ miles}$$

$$\text{Walk: } \frac{5}{3} \times 1\frac{3}{4} = \frac{5}{3} \times \frac{7}{4} = \frac{35}{12} = 2\frac{11}{12} \text{ miles}$$

$$\text{Rest: } \frac{5}{3} \times 2\frac{1}{2} = \frac{5}{3} \times \frac{5}{2} = \frac{25}{6} = 4\frac{1}{6} \text{ minutes}$$

$$\text{Walk: } \frac{5}{3} \times 1 = \frac{5}{3} = 1\frac{2}{3} \text{ miles}$$

8. Increase from day 1 to day 5

$$1\frac{1}{3} \times 1\frac{1}{3} \times 1\frac{1}{3} \times 1\frac{1}{3} = \left(\frac{4}{3}\right)^4 = \frac{256}{81}$$

$$\text{Jog: } \frac{256}{81} \times 1\frac{1}{2} = \frac{256}{81} \times \frac{3}{2} = \frac{128}{27} = 4\frac{20}{27} \text{ mi}$$

She would jog $4\frac{20}{27}$ miles on day 5.

10. Answers will vary. Possible answer: Melinda's trainer has the best plan because after 14 days she will be jogging and walking a gradual increase in distances. Over 14 days, Betty's schedule increases more. The amount of increase each day is larger. Eventually it is unrealistic.

12. a. $100\% - 12\% = 88\%$
 $0.88 \times 24 = 21.12$
 You get 21.12 oz from a dozen large eggs.
 $0.88 \times 21 = 18.48$
 You get 18.48 oz from a dozen medium eggs.

$$b. \quad \text{large: } \frac{2.79}{21.12} \approx \$0.1321/\text{oz};$$

$$\text{medium: } \frac{2.39}{18.48} \approx \$0.1293/\text{oz}$$

The medium eggs are the better buy.

14. a. From 13(b), the budget for food is \$14,104.15.
 $\$14,104.15 \times 0.20 = \$2820.83$
 $\$14,104.15 - \$2820.83 = \$11,283.32$
 The new food budget is \$11,283.32.

- b. $\$14,104.15 - \$11,283.32 = \$2820.83$
 $\$2820.83$ would be available to reduce the debt.

$$16. \quad \frac{12.56 + 36.28}{1150} = \frac{48.84}{1150} \approx 0.04 = 4\%$$

About 4% is deducted for retirement and medical.

$$18. \quad \frac{12.56 + 36.28 + 10.80}{1150} = \frac{59.64}{1150} \approx 0.05 = 5\%$$

About 5% is deducted for special deductions.

Classroom Quiz 0.6

$$1. \quad \frac{650}{2.5} = 260 \text{ tiles}$$

It will require 260 tiles to pave the courtyard.

$$2. \quad 3\% \text{ of } 495,000 = 0.03 \times 495,000 = 14,850.$$

$$\frac{14,850}{20,150 + 14,850} = \frac{14,850}{35,000} \approx 0.42 = 42\%$$

His commission was 42% of his total income.

$$3. \quad 2(115) + 2(210) = 230 + 420 = 650$$

$$5 \times 650 = \$3250$$

The fence will cost \$3250.

Career Exploration Problems

$$\begin{aligned}
 1. \quad &90\% \text{ of the first } \$826 = 0.9(\$826) = \$743.40 \\
 &32\% \text{ of earnings between } \$826 \text{ and } \$4980 \\
 &= 0.32(\$4200 - \$826) \\
 &= 0.32(\$3374) \\
 &= \$1079.68
 \end{aligned}$$

She has no earnings over \$4980.

$$\begin{aligned}
 \text{Monthly benefit} &= \$743.40 + \$1079.68 \\
 &= \$1823.08
 \end{aligned}$$

Cora's monthly benefit will be \$1823.08.

2. $\frac{\text{monthly benefit}}{\text{monthly earnings}} = \frac{\$1823.08}{\$4200} \approx 0.434$
 Cora's benefit is about 43.4% of her pre-retirement earnings.
3. a. The reduction at age 66 is 6.7%.
 $100\% - 6.7\% = 93.3\%$ or 0.933
 $0.933(\$1823.08) \approx \$1700.93$
 Cora's monthly benefit will be \$1700.93.
 $\$1823.08 - \$1700.93 = \$122.15$
 The total by which it would be reduced is \$122.15.
- b. The reduction at age 65 is 13.3%.
 $100\% - 13.3\% = 86.7\%$ or 0.867
 $0.867(\$1823.08) \approx \$1580.61$
 Cora's monthly benefit will be \$1580.61.
 $\$1823.08 - \$1580.61 = \$242.47$
 The total by which it would be reduced is \$242.47.

You Try It

1. a. $\frac{18}{27} = \frac{9 \times 2}{9 \times 3} = \frac{2}{3}$
- b. $\frac{45}{60} = \frac{15 \times 3}{15 \times 4} = \frac{3}{4}$
- c. $\frac{34}{85} = \frac{17 \times 2}{17 \times 5} = \frac{2}{5}$
2. a. $\frac{21}{5} = 5 \overline{)21} = 4 \frac{1}{5}$
- b. $\frac{37}{7} = 7 \overline{)37} = 5 \frac{2}{7}$
3. a. $2 \frac{2}{5} = \frac{2 \times 5 + 2}{5} = \frac{10 + 2}{5} = \frac{12}{5}$
- b. $6 \frac{1}{9} = \frac{6 \times 9 + 1}{9} = \frac{54 + 1}{9} = \frac{55}{9}$
4. $\frac{3}{8} = \frac{?}{40} \Rightarrow \frac{3 \times 5}{8 \times 5} = \frac{15}{40}$

5. a. $10 = 2 \times 5$
 $12 = 2 \times 2 \times 3$
 $\text{LCD} = 2 \times 2 \times 3 \times 5 = 60$
- b. $25 = 5 \times 5$
 $20 = 2 \times 2 \times 5$
 $\text{LCD} = 2 \times 2 \times 5 \times 5 = 100$
6. a. $\frac{1}{2} + \frac{1}{9} = \frac{1 \times 9}{2 \times 9} + \frac{1 \times 2}{9 \times 2} = \frac{9}{18} + \frac{2}{18} = \frac{11}{18}$
- b. $\frac{19}{24} - \frac{3}{8} = \frac{19}{24} - \frac{3 \times 3}{8 \times 3} = \frac{19}{24} - \frac{9}{24} = \frac{10}{24} = \frac{5}{12}$
7. a. $2 \frac{2}{3} + 3 \frac{1}{9} = \frac{8}{3} + \frac{28}{9} = \frac{24}{9} + \frac{28}{9} = \frac{52}{9} = 5 \frac{7}{9}$
- b. $3 \frac{5}{6} - 1 \frac{1}{3} = \frac{23}{6} - \frac{4}{3} = \frac{23}{6} - \frac{8}{6} = \frac{15}{6} = \frac{5}{2} = 2 \frac{1}{2}$
8. a. $\frac{5}{11} \times \frac{2}{3} = \frac{5 \times 2}{11 \times 3} = \frac{10}{33}$
- b. $\frac{7}{10} \times \frac{15}{21} = \frac{7}{2 \cdot 5} \times \frac{3 \cdot 5}{3 \cdot 7} = \frac{1}{2}$
- c. $6 \times \frac{3}{5} = \frac{6}{1} \times \frac{3}{5} = \frac{18}{5}$ or $3 \frac{3}{5}$
9. a. $\frac{3}{14} \div \frac{2}{5} = \frac{3}{14} \times \frac{5}{2} = \frac{15}{28}$
- b. $\frac{7}{12} \div \frac{7}{5} = \frac{7}{12} \times \frac{5}{7} = \frac{5}{12}$
10. a. $1 \frac{5}{6} \times 2 \frac{1}{4} = \frac{11}{6} \times \frac{9}{4} = \frac{99}{24} = \frac{33}{8}$ or $4 \frac{1}{8}$
- b. $3 \frac{1}{2} \div 1 \frac{3}{4} = \frac{7}{2} \div \frac{7}{4} = \frac{7}{2} \times \frac{4}{7} = \frac{7}{2} \times \frac{2 \cdot 2}{7} = \frac{2}{1} = 2$
11. $\frac{7}{8} = 8 \overline{)0.875} = 0.875$

12. a. $0.29 = \frac{29}{100}$

b. $0.175 = \frac{175}{1000} = \frac{7}{40}$

13. a.
$$\begin{array}{r} 2.338 \\ + 6.195 \\ \hline 8.533 \end{array}$$

b.
$$\begin{array}{r} 6.00 \\ - 2.54 \\ \hline 3.46 \end{array}$$

14. a.
$$\begin{array}{r} 1.5 \\ \times 0.9 \\ \hline 1.35 \end{array}$$

b.
$$\begin{array}{r} 5.12 \\ \times 0.67 \\ \hline 3584 \\ 3072 \\ \hline 3.4304 \end{array}$$

15.
$$\begin{array}{r} 18.5 \\ 0.5 \overline{)9.25} \\ \underline{5} \\ 42 \\ \underline{40} \\ 25 \\ \underline{25} \\ 0 \end{array}$$

16. a. $0.52 = 52\%$

b. $0.008 = 0.8\%$

c. $1.86 = 186\%$

d. $0.077 = 7.7\%$

e. $0.0009 = 0.09\%$

17. a. $28\% = 0.28$

b. $7.42\% = 0.0742$

c. $165\% = 1.65$

d. $0.25\% = 0.0025$

18. 15% of 92
 $0.15 \times 92 = 13.8$

19. a. What percent of 12 is 10?

$$\frac{10}{12} = \frac{5}{6} \approx 0.833 = 83.3\%$$

b. 50 is what percent of 40?

$$\frac{50}{40} = \frac{5}{4} = 1.25 = 125\%$$

20. $\text{Area} = 27 \times 11.5 \approx 25 \times 12 = 300$
 The room is approximately 300 ft².

21. $15 \text{ ft} = 5 \text{ yd}$

$$21\frac{3}{4} \text{ ft} = 7\frac{1}{4} \text{ yd}$$

$$\text{Area} = 5 \times 7\frac{1}{4} = \frac{5}{1} \times \frac{29}{4} = \frac{145}{4} \text{ yd}^2$$

$$\text{Cost} = 4.25 \times \frac{145}{4} \approx 154.06$$

The tile will cost \$154.06.

Chapter 0 Review Problems

1. $\frac{36}{48} = \frac{12 \times 3}{12 \times 4} = \frac{3}{4}$

2. $\frac{15}{50} = \frac{5 \times 3}{5 \times 10} = \frac{3}{10}$

3. $\frac{36}{82} = \frac{18 \times 2}{41 \times 2} = \frac{18}{41}$

4. $\frac{18}{30} = \frac{6 \times 3}{6 \times 5} = \frac{3}{5}$

5. $7\frac{1}{8} = \frac{7 \times 8 + 1}{8} = \frac{56 + 1}{8} = \frac{57}{8}$

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

7. $\frac{80}{3} = 3\frac{26}{3} = 26\frac{2}{3}$

$$8. \frac{5}{8} = \frac{?}{24} \Rightarrow \frac{5 \cdot 3}{8 \cdot 3} = \frac{15}{24}$$

$$9. \frac{1}{7} = \frac{?}{35} \Rightarrow \frac{1 \cdot 5}{7 \cdot 5} = \frac{5}{35}$$

$$10. \frac{3}{5} = \frac{?}{75} \Rightarrow \frac{3 \times 15}{5 \times 15} = \frac{45}{75}$$

$$11. \frac{2}{5} = \frac{?}{55} \Rightarrow \frac{2 \times 11}{5 \times 11} = \frac{22}{55}$$

$$12. \frac{3}{5} + \frac{1}{4} = \frac{3 \times 4}{5 \times 4} + \frac{1 \times 5}{4 \times 5} = \frac{12}{20} + \frac{5}{20} = \frac{17}{20}$$

$$13. \frac{7}{12} + \frac{5}{8} = \frac{7 \times 2}{12 \times 2} + \frac{5 \times 3}{8 \times 3} = \frac{14}{24} + \frac{15}{24} = \frac{29}{24} = 1 \frac{5}{24}$$

$$14. \frac{7}{20} - \frac{1}{12} = \frac{21}{60} - \frac{5}{60} = \frac{16}{60} = \frac{4}{15}$$

$$15. \frac{7}{10} - \frac{4}{15} = \frac{7 \cdot 3}{10 \cdot 3} - \frac{4 \cdot 2}{5 \cdot 2} = \frac{21}{30} - \frac{8}{30} = \frac{13}{30}$$

$$16. 3 \frac{1}{6} + 2 \frac{3}{5} = \frac{19}{6} + \frac{13}{5} = \frac{95}{30} + \frac{78}{30} = \frac{173}{30} = 5 \frac{23}{30}$$

$$17. 2 \frac{7}{10} + 3 \frac{3}{4} = \frac{27}{10} + \frac{15}{4} = \frac{54}{20} + \frac{75}{20} = \frac{129}{20} = 6 \frac{9}{20}$$

$$18. 6 \frac{2}{9} - 3 \frac{5}{12} = \frac{56}{9} - \frac{41}{12} \\ = \frac{56 \cdot 4}{9 \cdot 4} - \frac{41 \cdot 3}{12 \cdot 3} \\ = \frac{224}{36} - \frac{123}{36} \\ = \frac{101}{36} \\ = 2 \frac{29}{36}$$

$$19. 3 \frac{1}{15} - 1 \frac{3}{20} = \frac{46}{15} - \frac{23}{20} \\ = \frac{184}{60} - \frac{69}{60} \\ = \frac{115}{60} \\ = 1 \frac{23}{12}$$

$$20. 6 \times \frac{5}{11} = \frac{6}{1} \times \frac{5}{11} = \frac{30}{11} = 2 \frac{8}{11}$$

$$21. 2 \frac{1}{3} \times 4 \frac{1}{2} = \frac{7}{3} \times \frac{9}{2} = \frac{7}{3} \times \frac{3 \cdot 3}{2} = \frac{21}{2} = 10 \frac{1}{2}$$

$$22. 16 \times 3 \frac{1}{8} = \frac{16}{1} \times \frac{25}{8} = \frac{8 \cdot 2}{1} \times \frac{25}{8} = 50$$

$$23. \frac{4}{7} \times 5 = \frac{4}{7} \times \frac{5}{1} = \frac{20}{7} = 2 \frac{6}{7}$$

$$24. \frac{3}{8} \div 6 = \frac{3}{8} \times \frac{1}{6} = \frac{3}{8} \times \frac{1}{2 \cdot 3} = \frac{1}{16}$$

$$25. \frac{\frac{8}{3}}{\frac{5}{9}} = \frac{8}{3} \div \frac{5}{9} = \frac{8}{3} \times \frac{9}{5} = \frac{8}{3} \times \frac{3 \cdot 3}{5} = \frac{24}{5} = 4 \frac{4}{5}$$

$$26. \frac{15}{16} \div 6 \frac{1}{4} = \frac{15}{16} \div \frac{25}{4} = \frac{15}{16} \times \frac{4}{25} = \frac{3}{4} \times \frac{1}{5} = \frac{3}{20}$$

$$27. 2 \frac{6}{7} \div \frac{10}{21} = \frac{20}{7} \times \frac{21}{10} = \frac{2 \cdot 10}{7} \times \frac{3 \cdot 7}{10} = 6$$

$$28. \begin{array}{r} 1.634 \\ 3.007 \\ + 2.560 \\ \hline 7.201 \end{array}$$

$$29. \begin{array}{r} 24.831 \\ - 17.094 \\ \hline 7.737 \end{array}$$

$$30. \begin{array}{r} 47.251 \\ - 17.690 \\ \hline 29.561 \end{array}$$

$$\begin{array}{r} 31. \quad 1.900 \\ 2.530 \\ + 0.006 \\ \hline 4.436 \end{array}$$

$$\begin{array}{r} 32. \quad 5.35 \\ \times 0.007 \\ \hline 0.03745 \end{array}$$

$$33. \quad 362.341 \times 1000 = 362,341$$

$$34. \quad 2.6 \times 0.03 \times 1.02 = 0.07956$$

$$35. \quad 2.51 \times 100 \times 0.05 = 125.5$$

$$36. \quad 71.32 \div 1000 = 0.07132$$

$$37. \quad 0.523 \div 0.4 = 1.3075$$

$$38. \quad \begin{array}{r} 90 \\ 0.015 \overline{)1.350} \\ \underline{135} \\ 00 \end{array}$$

$$39. \quad \begin{array}{r} 4.186 \\ 2.3 \overline{)8.822} \\ \underline{46} \\ 42 \\ \underline{42} \\ 0 \end{array}$$

$$40. \quad \begin{array}{r} 0.375 \\ 8 \overline{)3.000} \\ \underline{24} \\ 60 \\ \underline{56} \\ 40 \\ \underline{40} \\ 0 \end{array}$$

$$41. \quad 0.36 = \frac{36}{100} = \frac{9}{25}$$

$$42. \quad 1.4\% = 0.014$$

$$43. \quad 36.1\% = 0.361$$

$$44. \quad 0.02\% = 0.0002$$

$$45. \quad 125.3\% = 1.253$$

$$46. \quad 0.0025 = 0.25\%$$

$$47. \quad 0.325 = 32.5\%$$

$$48. \quad 0.9 = 90\%$$

$$49. \quad 0.1 = 10\%$$

$$50. \quad \begin{array}{l} 30\% \text{ of } 400 \\ 0.30 \times 400 = 120 \end{array}$$

$$51. \quad \begin{array}{l} 7.2\% \text{ of } 55 \\ 0.072 \times 55 = 3.96 \end{array}$$

$$52. \quad \begin{array}{l} 76 \text{ is what percent of } 80? \\ \frac{76}{80} = 0.95 = 95\% \end{array}$$

$$53. \quad \frac{750}{1250} = 0.6 = 60\%$$

$$54. \quad \begin{array}{l} 80\% \text{ of } 16,850 \\ 0.8 \times 16,850 = 13,480 \\ 13,480 \text{ students have cell phones.} \end{array}$$

$$55. \quad \begin{array}{l} \frac{720}{960} = 0.75 = 75\% \\ 75\% \text{ of the class had a math deficiency.} \end{array}$$

$$56. \quad \begin{array}{l} 234,897 \times 1,936,112 \approx 200,000 \times 2,000,000 \\ = 400,000,000,000 \end{array}$$

$$57. \quad \begin{array}{l} 357 + 923 + 768 + 417 \approx 400 + 900 + 800 + 400 \\ = 2500 \end{array}$$

$$58. \quad \begin{array}{l} 634,318 - 284,000 \approx 600,000 - 300,000 \\ \approx 300,000 \end{array}$$

$$59. \quad 21\frac{1}{5} - 8\frac{4}{5} - 1\frac{2}{3} \approx 20 - 9 - 2 = 9$$

$$60. \quad 18\% \text{ of } 56,297 \approx 0.2 \times 60,000 = \$12,000$$

$$61. \quad 12,482 \div 389 \approx 10,000 \div 400 = 25$$

$$62. \quad \begin{array}{l} 38.5 \times 8.35 \approx 40 \times 8 = \$320 \\ \text{Her estimated salary is } \$320. \end{array}$$

$$63. \quad \begin{array}{l} \frac{3875}{5} \approx \frac{4000}{5} = \$800 \\ \text{Each family owes about } \$800. \end{array}$$

$$\begin{aligned}
 64. \text{ Maximum distance} &= 7\frac{2}{3} \times 240 \\
 &= \frac{23}{3} \times 240 \\
 &= 1840 \text{ miles}
 \end{aligned}$$

The plane can fly 1840 miles.

$$\text{Longest trip} = 80\% \times 1840$$

$$= 0.8 \times 1840$$

$$= 1472 \text{ miles}$$

The longest trip he would take is 1472 miles.

$$65. \text{ Distance at maximum speed:}$$

$$6\frac{1}{4} \times 240 = \frac{25}{4} \times 240 = 1500$$

The plane can fly 1500 miles.

$$0.70 \times 1500 = 1050$$

The longest trip he would take is 1050 miles.

$$\begin{aligned}
 66. \text{ Area} &= 12\frac{1}{2} \times 9\frac{2}{3} \\
 &= \frac{25}{2} \times \frac{29}{3} \\
 &= 120\frac{5}{6} \text{ sq feet} \\
 &= \frac{120\frac{5}{6}}{9} \\
 &= 13\frac{23}{54} \text{ sq yards}
 \end{aligned}$$

$$\text{Cost} = 26.00 \times 13\frac{23}{54} = 26 \times \frac{725}{54} = \$349.07$$

The total cost is \$349.07.

$$67. 8\% \text{ of } 5785$$

$$0.08 \times 5785 = \$462.80$$

His commission was \$462.80.

$$68. \text{ Amount paid} = 225 \times 4 \times 12 = \$10,800$$

$$\text{Interest} = 10,800 - 9214.50 = \$1585.50$$

They paid \$1585.50 more than the car loan.

$$69. \text{ Regular pay} = 7.50 \times 40 = 300$$

$$\text{O/T hours} = 49 - 40 = 9$$

$$\text{O/T pay rate} = 1.5 \times 7.5 = 11.25$$

$$\text{O/T pay} = 11.25 \times 9 = 101.25$$

$$\text{Total pay} = 300 + 101.25 = \$401.25$$

He was paid a total of \$401.25.

How Am I Doing? Chapter 0 Test

$$1. \frac{16}{18} = \frac{2 \times 8}{2 \times 9} = \frac{8}{9}$$

$$2. \frac{48}{36} = \frac{4 \times 12}{3 \times 12} = \frac{4}{3}$$

$$3. 6\frac{3}{7} = \frac{6 \times 7 + 3}{7} = \frac{45}{7}$$

$$4. \frac{105}{9} = 9 \overline{)105} = 11\frac{6}{9} = 11\frac{2}{3}$$

$$\begin{aligned}
 5. \frac{2}{3} + \frac{5}{6} + \frac{3}{8} &= \frac{2 \cdot 8}{3 \cdot 8} + \frac{5 \cdot 4}{6 \cdot 4} + \frac{3 \cdot 3}{8 \cdot 3} \\
 &= \frac{16}{24} + \frac{20}{24} + \frac{9}{24} \\
 &= \frac{45}{24} \\
 &= \frac{15}{8} \text{ or } 1\frac{7}{8}
 \end{aligned}$$

$$6. 1\frac{1}{8} + 3\frac{3}{4} = \frac{9}{8} + \frac{15}{4} = \frac{9}{8} + \frac{30}{8} = \frac{9+30}{8} = \frac{39}{8} = 4\frac{7}{8}$$

$$7. 3\frac{2}{3} - 2\frac{5}{6} = \frac{11}{3} - \frac{17}{6} = \frac{22}{6} - \frac{17}{6} = \frac{5}{6}$$

$$8. \frac{5}{7} \times \frac{28}{15} = \frac{1}{1} \times \frac{4}{3} = \frac{4}{3} \text{ or } 1\frac{1}{3}$$

$$9. \frac{7}{4} \div \frac{1}{2} = \frac{7}{4} \times \frac{2}{1} = \frac{7}{2} \times \frac{1}{1} = \frac{7}{2} \text{ or } 3\frac{1}{2}$$

$$\begin{aligned}
 10. 5\frac{3}{8} \div 2\frac{3}{4} &= \frac{43}{8} \div \frac{11}{4} \\
 &= \frac{43}{2 \cdot 4} \times \frac{4}{11} \\
 &= \frac{43}{22} \\
 &= 1\frac{21}{22}
 \end{aligned}$$

$$11. 2\frac{1}{2} \times 3\frac{1}{4} = \frac{5}{2} \times \frac{13}{4} = \frac{65}{8} = 8\frac{1}{8}$$

$$12. \frac{7}{8} = \frac{7}{8} \div \frac{1}{4} = \frac{7}{8} \times \frac{4}{1} = \frac{7}{2} \times \frac{1}{1} = \frac{7}{2} \text{ or } 3\frac{1}{2}$$

$$\begin{array}{r} 13. \quad 1.60 \\ \quad 3.24 \\ + 9.80 \\ \hline 14.64 \end{array}$$

$$\begin{array}{r} 14. \quad 7.0046 \\ \quad - 3.0149 \\ \hline 3.9897 \end{array}$$

$$\begin{array}{r} 15. \quad 32.8 \\ \quad \times 0.04 \\ \hline 1.312 \end{array}$$

$$16. \quad 0.07385 \times 1000 = 73.85$$

$$\begin{array}{r} 17. \quad 0.056 \overline{)12.880} \wedge \\ \quad \underline{11 \ 2} \\ \quad 1 \ 68 \\ \quad \underline{1 \ 68} \\ \quad 0 \end{array}$$

$$18. \quad 26,325.9 \div 100 = 263.259$$

$$19. \quad 0.073 = 7.3\%$$

$$20. \quad 196.5\% = 1.965$$

$$\begin{array}{l} 21. \quad \text{What is } 3.5\% \text{ of } 180? \\ \quad 0.035 \times 180 = 6.3 \end{array}$$

$$22. \quad 39 \text{ is what percent of } 650?$$

$$\frac{39}{650} = 0.06 = 6\%$$

$$23. \quad 4 \div \frac{2}{9} = \frac{4}{1} \times \frac{9}{2} = \frac{2}{1} \times \frac{9}{1} = 18$$

18 chips are in the stack.

$$24. \quad 52,344 \overline{)4,678,987} \approx 50,000 \overline{)5,000,000} \frac{100}{}$$

$$25. \quad 285.36 + 311.85 + 113.6 \approx 300 + 300 + 100 = 700$$

$$26. \quad \text{Commission: } (0.03)(870,000) = 26,100$$

Total income: $26,100 + 14,000 = 40,100$

$$\text{Percent: } \frac{26,100}{40,100} \approx 0.65 = 65\%$$

Her commission was 65% of her total income.

$$\begin{aligned} 27. \quad 210 \div 3 \frac{1}{2} &= \frac{210}{1} \div \frac{7}{2} \\ &= \frac{210}{1} \times \frac{2}{7} \\ &= \frac{30 \times 7}{1} \times \frac{2}{7} \\ &= 60 \end{aligned}$$

They will need 60 tiles.

Chapter 1

1.1 Exercises

	Number	Int	RaN	IR	ReN
2.	$-\frac{4}{5}$		X		X
4.	2.34		X		X
6.	$-\frac{7}{9}$		X		X
8.	14	X	X		X
10.	3.232232223...			X	X

12. Up \$0.07 $\Rightarrow$ +0.07

14. 3642 feet above sea level $\Rightarrow$ +3642

16. 52 feet below sea level $\Rightarrow$ -52

18. Opposite of $-\frac{3}{7}$ is $\frac{3}{7}$.

20. Opposite of 85.4 is -85.4.

22. $|-5.9| = 5.9$

24. $\left| \frac{3}{11} \right| = \frac{3}{11}$

26. $-14 + (-3) = -17$

28. $(-17) + (-23) = -40$

30. $-\frac{3}{7} + \left(-\frac{2}{7}\right) = -\frac{5}{7}$

32. $-\frac{3}{16} + \frac{5}{16} = \frac{2}{16} = \frac{1}{8}$

34. $-\frac{2}{7} + \frac{3}{14} = -\frac{4}{14} + \frac{3}{14} = -\frac{1}{14}$

36. $-5.4 + (-12.8) = -18.2$

38. $-0.8 + 0.5 = -0.3$

40. $-6.48 + (-3.7) = -10.18$

42. $-3 + (-9) + (-2) = -12 + (-2) = -14$

44. $-8 + 7 + (-15) = -1 + (-15) = -16$

46. $-\frac{3}{8} + \frac{11}{24} = -\frac{9}{24} + \frac{11}{24} = \frac{2}{24} = \frac{1}{12}$

48. $-18 + 10 + (-5) = -8 + (-5) = -13$

50. $15 + (-26) = -11$

52. $-114 + 186 = 72$

54. $-\frac{3}{5} + \frac{2}{3} = -\frac{9}{15} + \frac{10}{15} = \frac{1}{15}$

56. $-\frac{2}{3} + \left(-\frac{1}{4}\right) = -\frac{8}{12} + \left(-\frac{3}{12}\right) = -\frac{11}{12}$

58. $8.33 + (-14.2) = -5.87$

60. $-7 + (-15) + (-6) = -22 + (-6) = -28$

62. $-16 + 12 + (-26) + 15 = -4 + (-26) + 15$
 $= -30 + 15$
 $= -15$

64. $28.37 + 4.08 + (-16.98) = 32.45 + (-16.98)$
 $= 15.47$

66. $-12 + 7 = -5$
The temperature at the summit is -5°F .

68. $11 + (-15) = -4$ hours from 12 A.M.
 $12 + (-4) = 8$
It is 8 A.M. in New York.

70. Account balance: $643.85 - 185.50 = \$458.35$
Short: $475 - 458.35 = \$16.65$
No; she is short \$16.65.

72. $-258 + (-32) + 150 = -290 + 150 = -140$
He still owes \$140.

74. $30 + 14 + (-16) + (-22) + 5$
 $= 44 + (-16) + (-22) + 5$
 $= 6 + 5$
 $= 11$
The total earnings were \$11,000,000.

76. $-18 + ? = 10$
 $-18 + 28 = 10$
 $? = 28$

Cumulative Review

$$77. \frac{15}{16} + \frac{1}{4} = \frac{15}{16} + \frac{4}{16} = \frac{19}{16} \text{ or } 1\frac{3}{16}$$

$$78. \frac{3}{7} \times \frac{14}{9} = \frac{3 \cdot 14}{7 \cdot 9} = \frac{3 \cdot 2 \cdot 7}{7 \cdot 3 \cdot 3} = \frac{2}{3}$$

$$79. \frac{2}{15} - \frac{1}{20} = \frac{8}{60} - \frac{3}{60} = \frac{5}{60} = \frac{1}{12}$$

$$80. 2\frac{1}{2} \div 3\frac{2}{5} = \frac{5}{2} \div \frac{17}{5} = \frac{5}{2} \cdot \frac{5}{17} = \frac{25}{34}$$

$$81. 0.72 + 0.8 = 1.52$$

$$82. 1.63 - 0.98 = 0.65$$

$$83. \begin{array}{r} 1.63 \\ \times 0.7 \\ \hline 1.141 \end{array}$$

$$84. 0.208 \div 0.8 = 0.26$$

Classroom Quiz 1.1

$$1. 27 + (-34) = -7$$

$$2. -3.4 + 8.9 + (-4.8) = 5.5 + (-4.8) = 0.7$$

$$3. -\frac{7}{8} + \frac{11}{24} = -\frac{21}{24} + \frac{11}{24} = -\frac{10}{24} = -\frac{5}{12}$$

1.2 Exercises

2. First change subtracting -15 to adding a positive fifteen. Then use the rules for addition of two real numbers with different signs. Thus $-10 - (-15) = -10 + 15 = 5$.

$$4. 23 - 57 = 23 + (-57) = -34$$

$$6. 8 - 19 = 8 + (-19) = -11$$

$$8. -17 - (-13) = -17 + 13 = -4$$

$$10. -48 - (-80) = -48 + 80 = 32$$

$$12. 0 - (-7) = 0 + 7 = 7$$

$$14. -24 - (-24) = -24 + 24 = 0$$

$$16. -11 - (-19) = -11 + 19 = 8$$

$$18. \frac{2}{9} - \frac{7}{9} = \frac{2}{9} + \left(-\frac{7}{9}\right) = -\frac{5}{9}$$

$$20. -\frac{2}{3} - \frac{1}{4} + -\frac{2}{3} + \left(-\frac{1}{4}\right) = -\frac{8}{12} + \left(-\frac{3}{12}\right) = -\frac{11}{12}$$

$$22. -\frac{7}{10} - \frac{10}{15} = -\frac{7}{10} + \left(-\frac{10}{15}\right) \\ = -\frac{21}{30} + \left(-\frac{20}{30}\right) \\ = -\frac{41}{30} \text{ or } -1\frac{11}{30}$$

$$24. -0.9 - 0.5 = -0.9 + (-0.5) = -1.4$$

$$26. -0.03 - 0.06 = -0.03 + (-0.06) = -0.09$$

$$28. \frac{5}{6} - 3 = \frac{5}{6} + \left(-\frac{18}{6}\right) = -\frac{13}{6} \text{ or } -2\frac{1}{6}$$

$$30. -\frac{1}{6} - 5 = -\frac{1}{6} + \left(-\frac{30}{6}\right) = -\frac{31}{6} \text{ or } -5\frac{1}{6}$$

$$32. 19 - 76 = 19 + (-76) = -57$$

$$34. -74 - 11 = -74 + (-11) = -85$$

$$36. 8.4 - (-2.7) = 8.4 + 2.7 = 11.1$$

$$38. \frac{2}{3} - (-6) = \frac{2}{3} + 6 = 6\frac{2}{3} \text{ or } \frac{20}{3}$$

$$40. 9 - \frac{2}{3} = \frac{27}{3} + \left(-\frac{2}{3}\right) = \frac{25}{3} \text{ or } 8\frac{1}{3}$$

$$42. -\frac{5}{6} - \frac{1}{5} = -\frac{25}{30} + \left(-\frac{6}{30}\right) = -\frac{31}{30} \text{ or } -1\frac{1}{30}$$

$$44. -97.6 - (-146) = -97.6 + 146 = 48.4$$

$$46. \frac{2}{7} - (-3) = \frac{2}{7} + 3 = \frac{2}{7} + \frac{21}{7} = \frac{23}{7} \text{ or } 3\frac{2}{7}$$

$$48. 5.2 - (-3.88) = 5.2 + 3.88 = 9.08$$

$$50. -1.043 - 4 = -1.043 + (-4) = -5.043$$

$$52. 20 - (-12) = 20 + 12 = 32$$

$$54. 9 + (-7) - 5 = 9 + (-7) + (-5) = 2 + (-5) = -3$$

$$56. -18 + 12 - (-6) = -18 + 12 + 6 = -6 + 6 = 0$$

$$\begin{aligned} 58. -23 - (-12) - (-4) + 17 &= -23 + 12 + 4 + 17 \\ &= -11 + 4 + 17 \\ &= -7 + 17 \\ &= 10 \end{aligned}$$

$$\begin{aligned} 60. -8.3 - (-2.6) + 1.9 &= -8.3 + 2.6 + 1.9 \\ &= -5.7 + 1.9 \\ &= -3.8 \end{aligned}$$

$$62. 300 - (-126) = 300 + 126 = 426$$

The helicopter is 426 feet from the submarine.

$$64. \$156 - (-\$37) = \$156 + \$37 = \$193$$

Cumulative Review

$$65. -37 + 16 = -21$$

$$66. -37 + (-14) = -51$$

$$67. -3 + (-6) + (-10) = -9 + (-10) = -19$$

$$68. -5 + 20 = 15$$

The afternoon temperature was 15°F.

$$69. \left(\frac{4}{5}\right)\left(8\frac{1}{3}\right) = \left(\frac{4}{5}\right)\left(\frac{25}{3}\right) = \frac{20}{3} = 6\frac{2}{3}$$

There were $6\frac{2}{3}$ miles covered in snow.

Classroom Quiz 1.2

$$1. -19 - (-13) = -19 + 13 = -6$$

$$2. -4.2 - 1.5 = -4.2 + (-1.5) = -5.7$$

$$3. \frac{2}{9} - \left(-\frac{3}{5}\right) = \frac{2}{9} + \frac{3}{5} = \frac{10}{45} + \frac{27}{45} = \frac{37}{45}$$

1.3 Exercises

2. To multiply three or more real numbers, multiply the absolute values. The sign of the result is positive if there is an even number of negative signs. It is negative if there is an odd number of negative signs.

$$4. 9(-9) = -81$$

$$6. 0(136) = 0$$

$$8. 7.5(8) = 60$$

$$10. (-2.3)(-0.11) = 0.253$$

$$12. (3.4)(-2.2) = -7.48$$

$$14. (5)\left(-\frac{7}{10}\right) = -\frac{7}{2} \text{ or } -3\frac{1}{2}$$

$$16. \left(-\frac{4}{9}\right)\left(-\frac{3}{5}\right) = \frac{4}{15}$$

$$18. \left(\frac{14}{17}\right)\left(-\frac{3}{28}\right) = -\frac{3}{34}$$

$$20. 0 \div (-13) = 0$$

$$22. -64 \div 8 = \frac{-64}{8} = -8$$

$$24. -180 \div (-4) = 45$$

$$26. \frac{-20}{10} = -2$$

$$28. 8.1 \div (-0.03) = \frac{8.1}{-0.03} = -270$$

$$30. -7.2 \div 8 = \frac{-7.2}{8} = -0.9$$

$$32. \frac{2}{7} \div \left(-\frac{3}{5}\right) = \frac{2}{7} \cdot \left(-\frac{5}{3}\right) = -\frac{10}{21}$$

$$34. \left(-\frac{5}{6}\right) \div \left(-\frac{7}{18}\right) = \left(-\frac{5}{6}\right)\left(-\frac{18}{7}\right) = \frac{15}{7} \text{ or } 2\frac{1}{7}$$

$$36. \left(-\frac{4}{9}\right) \div \left(-\frac{8}{15}\right) = \left(-\frac{4}{9}\right)\left(-\frac{15}{8}\right) = \frac{5}{6}$$

$$38. \frac{12}{-\frac{2}{5}} = \frac{12}{1} \left(-\frac{5}{2}\right) = -30$$

$$40. \frac{-\frac{3}{8}}{-\frac{2}{3}} = -\frac{3}{8} \left(-\frac{3}{2}\right) = \frac{9}{16}$$

$$42. \frac{\frac{9}{2}}{-3} = \frac{9}{2} \cdot \left(-\frac{1}{3}\right) = -\frac{9}{6} = -\frac{3}{2} \text{ or } -1\frac{1}{2}$$

$$44. (-6)(2)(-3)(4) = (12)(3)(4) = (36)(4) = 144$$

46. $-3(2)(-1)(-2)(5) = -60$

48. $-6(2)(-3)(0)(-9) = 0$

50. $-2(0.14)(-3)(0.5) = -0.28(-3)(0.5)$
 $= 0.84(0.5)$
 $= 0.42$

52. $\left(\frac{3}{7}\right)\left(-\frac{2}{3}\right)\left(-\frac{5}{3}\right) = -\frac{2}{7}\left(-\frac{5}{3}\right) = \frac{10}{21}$

54. $\left(-\frac{2}{3}\right)\left(-\frac{1}{4}\right)\left(\frac{3}{5}\right)\left(-\frac{2}{7}\right) = -\left(\frac{1}{6}\right)\left(\frac{3}{5}\right)\left(\frac{2}{7}\right)$
 $= -\left(\frac{1}{10}\right)\left(\frac{2}{7}\right)$
 $= -\frac{1}{35}$

56. $-5 - (-2) = -5 + 2 = -3$

58. $-4(-8) = 32$

60. $(-30) \div 5 = \frac{-30}{5} = -6$

62. $-6 + (-3) = -9$

64. $18 \div (-18) = -1$

66. $90(47.24 - 50.46) = 90(-3.22) = -289.8$
That day had a loss of \$289.80.

68. Payments: $180(12) = \$2160$
Owing: $6480 - 2160 = \$4320$
He still owes \$4320.

70. $-5(10) = -50$, lost 50 yards in small losses.

72. Total $= -50 + 20 = -30$, the result is a loss of 30 yards.

74. $15(6) = +90$, gained 90 yards in medium gains.

Cumulative Review

76. $-17.4 + 8.31 + 2.40 = -9.09 + 2.40 = -6.69$

77. $-\frac{3}{4} + \left(-\frac{2}{3}\right) + \left(-\frac{5}{12}\right) = -\frac{9}{12} + \left(-\frac{8}{12}\right) + \left(-\frac{5}{12}\right)$
 $= -\frac{17}{12} + \left(-\frac{5}{12}\right)$
 $= -\frac{22}{12}$
 $= -\frac{11}{6}$ or $-1\frac{5}{6}$

78. $-47 - (-32) = -47 + 32 = -15$

79. $-37 - 51 = -37 + (-51) = -88$

Classroom Quiz 1.3

1. $\left(-\frac{4}{7}\right)(6) = -\frac{4}{7} \cdot \frac{6}{1} = -\frac{24}{7}$ or $-3\frac{3}{7}$

2. $-2(-5)(3)(-6) = 10(3)(-6) = 30(-6) = -180$

3. $-4.5 \div (-0.9) = \frac{-4.5}{-0.9} = 5$

1.4 Exercises2. The base is 9 and the exponent is 2. Thus you multiply $(9)(9) = 81$.

4. The answer is negative. When you raise a negative number to an odd power the result is always negative.

6. If you have parentheses surrounding the -3 , then the base is -3 and the exponent is 4. The result is 81. Without parentheses, the base is 3. You evaluate to obtain 81 and then take the opposite of 81, which is -81 . Thus $(-3)^4 = 81$, but $-3^4 = -81$.

8. $(8) \cdot (8) \cdot (8) \cdot (8) \cdot (8) \cdot (8) = 8^6$

10. $(x)(x)(x)(x) = x^4$

12. $(r) \cdot (r) \cdot (r) \cdot (r) \cdot (r) \cdot (r) \cdot (r) = r^7$

14. $(2w)(2w)(2w)(2w)(2w) = (2w)^5$ or $2^5 w^5$

16. $9^2 = 81$

18. $7^3 = 343$

20. $12^2 = 144$

22. $(-2)^3 = (-2)(-2)(-2) = -8$

24. $-(-5)^3 = -(5)(5)(5) = -125$

26. $-4^2 = -(4)(4) = -16$

28. $\left(\frac{3}{4}\right)^2 = \left(\frac{3}{4}\right)\left(\frac{3}{4}\right) = \frac{9}{16}$

30. $\left(\frac{1}{3}\right)^3 = \left(\frac{1}{3}\right)\left(\frac{1}{3}\right)\left(\frac{1}{3}\right) = \frac{1}{27}$

32. $(1.5)^2 = (1.5)(1.5) = 2.25$

34. $(0.7)^3 = (0.7)(0.7)(0.7) = 0.343$

36. $(-7)^4 = (-7)(-7)(-7)(-7) = 2401$

38. $-7^4 = -(7)(7)(7)(7) = -2401$

40. $6^2 + 2^3 = 36 + 8 = 44$

42. $5^3 - 2^2 = 125 - 4 = 121$

44. $14^2 - (-6)^2 = 196 - 36 = 160$

46. $7^2 - (-2)^4 = 49 - 16 = 33$

Cumulative Review

$$\begin{aligned}
 48. \quad (-11) + (-13) + 6 + (-9) + 8 &= -24 + 6 + (-9) + 8 \\
 &= -18 + (-9) + 8 \\
 &= -27 + 8 \\
 &= -19
 \end{aligned}$$

$$\begin{aligned}
 49. \quad \frac{3}{4} \div \left(-\frac{9}{20}\right) &= \left(\frac{3}{4}\right)\left(-\frac{20}{9}\right) \\
 &= \left(\frac{3}{4}\right)\left(-\frac{4 \cdot 5}{3 \cdot 3}\right) \\
 &= -\frac{5}{3} \text{ or } -1\frac{2}{3}
 \end{aligned}$$

50. $-17 - (-9) = -17 + 9 = -8$

51. $(-2.1)(-1.2) = 2.52$

52. $6\% \text{ of } 1600 = 0.06 \times 1600 = 96$

$1600 + 96 = 1696$

She has \$1696 at the end of the year.

Classroom Quiz 1.4

1. $(-6)^3 = (-6)(-6)(-6) = -216$

2. $(2.3)^2 = (2.3)(2.3) = 5.29$

3. $\left(\frac{2}{5}\right)^4 = \left(\frac{2}{5}\right)\left(\frac{2}{5}\right)\left(\frac{2}{5}\right)\left(\frac{2}{5}\right) = \frac{16}{625}$

1.5 Exercises

2. $4 + 4 + 4 + 5 + 5 + 5 + 5 + 5 + 5 = 42$

4. (b) gives the correct total.

$$\begin{aligned}
 6. \quad (5-8)^2 \div 3 \times 6 &= (-3)^2 \div 3 \times 6 \\
 &= 9 \div 3 \times 6 \\
 &= 3 \times 6 \\
 &= 18
 \end{aligned}$$

8. $13 + 2(-8 + 6 - 3) = 13 + 2(-5) = 13 + (-10) = 3$

$$\begin{aligned}
 10. \quad 7 - 3^2 \cdot 4 + 5 &= 7 - 9 \cdot 4 + 5 \\
 &= 7 - 36 + 5 \\
 &= -29 + 5 \\
 &= -24
 \end{aligned}$$

12. $7 + 36 \div 12 \cdot 3 - 14 = 7 + 3 \cdot 3 - 14 = 7 + 9 - 14 = 2$

$$\begin{aligned}
 14. \quad 2 \cdot 6 + 5 \cdot 3 - 7 \cdot 4 &= 12 + 5 \cdot 3 - 7 \cdot 4 \\
 &= 12 + 15 - 7 \cdot 4 \\
 &= 12 + 15 - 28 \\
 &= -1
 \end{aligned}$$

$$\begin{aligned}
 16. \quad 11 - 3(4)^2 \div (-6) &= 11 - 3(16) \div (-6) \\
 &= 11 - 48 \div (-6) \\
 &= 11 + 8 \\
 &= 19
 \end{aligned}$$

$$\begin{aligned}
 18. \quad -2(3-6)^2 - (-2) &= -2(-3)^2 + 2 \\
 &= -2(9) + 2 \\
 &= -18 + 2 \\
 &= -16
 \end{aligned}$$

$$\begin{aligned}
 20. \quad (-5)^2 + (15 \div 3) + 4 \cdot 2 &= (-5)^2 + 5 + 4 \cdot 2 \\
 &= 25 + 5 + 4 \cdot 2 \\
 &= 25 + 5 + 8 \\
 &= 38
 \end{aligned}$$

$$22. \quad \frac{5}{6} \div \frac{2}{3} - 6 \cdot \left(\frac{1}{2}\right)^2 = \frac{5}{6} \cdot \frac{3}{2} - \frac{6}{1} \cdot \frac{1}{4} = \frac{5}{4} - \frac{6}{4} = -\frac{1}{4}$$

$$\begin{aligned}
 24. \quad 0.05 + 1.4 - (0.5 - 0.7)^3 &= 0.05 + 1.4 - (-0.2)^3 \\
 &= 0.05 + 1.4 - (-0.008) \\
 &= 1.45 + 0.008 \\
 &= 1.458
 \end{aligned}$$

$$\begin{aligned}
 26. \quad \frac{1}{2} \div \frac{4}{5} - \frac{3}{4} \left(\frac{5}{6}\right) &= \frac{1}{2} \left(\frac{5}{4}\right) - \frac{3}{4} \left(\frac{5}{6}\right) \\
 &= \frac{5}{8} - \frac{15}{24} \\
 &= \frac{15}{24} - \frac{15}{24} \\
 &= 0
 \end{aligned}$$

$$\begin{aligned}
 28. \quad (5 - 6)^2 \cdot 7 - 4 &= (-1)^2 \cdot 7 - 4 \\
 &= 1 \cdot 7 - 4 \\
 &= 7 - 4 \\
 &= 3
 \end{aligned}$$

$$\begin{aligned}
 30. \quad \left(2\frac{4}{7}\right) \div \left(-1\frac{1}{5}\right) &= \left(\frac{18}{7}\right) \div \left(-\frac{6}{5}\right) \\
 &= \left(\frac{18}{7}\right) \left(-\frac{5}{6}\right) \\
 &= -\frac{15}{7} \text{ or } -2\frac{1}{7}
 \end{aligned}$$

$$\begin{aligned}
 32. \quad 5.15 + 4.2 \div (-0.3) - (3.5)^2 \\
 &= 5.15 + 4.2 \div (-0.3) - 12.25 \\
 &= 5.15 + (-14) - 12.25 \\
 &= -8.85 - 12.25 \\
 &= -21.1
 \end{aligned}$$

$$\begin{aligned}
 34. \quad \left(\frac{1}{2}\right)^3 + \frac{1}{4} - \left(\frac{2}{3} - \frac{1}{6}\right) + \left(-\frac{1}{3}\right)^2 \\
 &= \left(\frac{1}{2}\right)^3 + \frac{1}{4} - \frac{1}{2} + \left(-\frac{1}{3}\right)^2 \\
 &= \frac{1}{8} + \frac{1}{4} - \frac{1}{2} + \frac{1}{9} \\
 &= \frac{9}{72} + \frac{18}{72} - \frac{36}{72} + \frac{8}{72} \\
 &= -\frac{1}{72}
 \end{aligned}$$

$$\begin{aligned}
 36. \quad 1(-2) + 5(-1) + 10(0) + 2(+1) \\
 &= -2 + (-5) + 0 + 2 \\
 &= -5 \text{ or } 5 \text{ under par}
 \end{aligned}$$

38. Exercise 37 did not use the order of operations.

Cumulative Review

$$39. \quad (0.5)^3 = (0.5)(0.5)(0.5) = 0.125$$

$$40. \quad -\frac{3}{4} - \frac{5}{6} = -\frac{9}{12} - \frac{10}{12} = -\frac{19}{12} = -1\frac{7}{12}$$

$$41. \quad -1^{20} = -1$$

$$42. \quad 3\frac{3}{5} \div 6\frac{1}{4} = \frac{18}{5} \div \frac{25}{4} = \frac{18}{5} \cdot \frac{4}{25} = \frac{72}{125}$$

Classroom Quiz 1.5

$$\begin{aligned}
 1. \quad 6 - 4^3 + 7 - 12 &= 6 - 64 + 7 - 12 \\
 &= -58 + 7 - 12 \\
 &= -51 - 12 \\
 &= -63
 \end{aligned}$$

$$\begin{aligned}
 2. \quad (0.6)^2 - (-2)(-3.5) + 0.23 \\
 &= 0.36 - (-2)(-3.5) + 0.23 \\
 &= 0.36 - 7 + 0.23 \\
 &= -6.64 + 0.23 \\
 &= -6.41
 \end{aligned}$$

$$\begin{aligned}
 3. \quad -3(4 - 5)^5 + 36 \div (-9) + 8 \\
 &= -3(-1)^5 + 36 \div (-9) + 8 \\
 &= -3(-1) + 36 \div (-9) + 8 \\
 &= 3 + 36 \div (-9) + 8 \\
 &= 3 + (-4) + 8 \\
 &= -1 + 8 \\
 &= 7
 \end{aligned}$$

Use Math to Save Money

- $(\$2500 \times 0.05) \times 12 = \$1500$
- $(\$2500 \times 0.15) \times 12 = \$4500$
- $\$3000 + \$450 = \$3450$
- $\$2500 \times 0.05 = \$125$
 $\$3450 \div \$125 = 27.6 \approx 28$ months
 He will need to save for 28 months or 2 years, 4 months.
- $\$2500 \times 0.10 = \$250$
 $\$3450 \div \$250 = 13.8 \approx 14$ months
 He will need to save for 14 months or 1 year, 2 months.
- $\left[2500 + \left(\frac{5800}{12} \right) \right] \times 0.05 = \$149.17$ per month
- $\left[2500 + \left(\frac{5800}{12} \right) \right] \times 0.20 = \$596.67$ per month
- Answers will vary.
- Answers will vary.
- Answers will vary.

How Am I Doing? Sections 1.1–1.5

(Available online through MyMathLab or from the Instructor's Resource Center.)

- $3 + (-12) = -9$
- $-\frac{5}{6} + \left(-\frac{7}{8}\right) = -\frac{20}{24} + \left(-\frac{21}{24}\right) = -\frac{41}{24} = -1\frac{17}{24}$
- $$\begin{array}{r} 0.34 \\ + 0.90 \\ \hline 1.24 \end{array}$$
- $-3.5 + 9 + 2.3 + (-3) = 5.5 + 2.3 + (-3)$
 $= 7.8 + (-3)$
 $= 4.8$
- $-23 - (-34) = -23 + 34 = 11$
- $-\frac{1}{6} - \frac{4}{5} = -\frac{1}{6} + \left(-\frac{4}{5}\right) = -\frac{5}{30} + \left(-\frac{24}{30}\right) = -\frac{29}{30}$
- $4.5 - (-7.8) = 4.5 + 7.8 = 12.3$

- $-4 - (-5) + 9 = -4 + 5 + 9 = 10$
- $(-3)(-8)(2)(-2) = 24(2)(-2) = 48(-2) = -96$
- $\left(-\frac{6}{11}\right)\left(-\frac{5}{3}\right) = \frac{10}{11}$
- $-0.072 \div 0.08 = \frac{-0.072}{0.08} = -0.9$
- $\frac{5}{8} \div \left(-\frac{17}{16}\right) = \left(\frac{5}{8}\right) \cdot \left(-\frac{16}{17}\right) = -\frac{10}{17}$
- $(0.7)^3 = (0.7)(0.7)(0.7) = 0.343$
- $(-4)^4 = (-4)(-4)(-4)(-4) = 256$
- $-2^8 = -(2)(2)(2)(2)(2)(2)(2)(2) = -256$
- $\left(\frac{2}{3}\right)^3 = \left(\frac{2}{3}\right)\left(\frac{2}{3}\right)\left(\frac{2}{3}\right) = \frac{8}{27}$
- $-3^3 + 3^4 = -27 + 81 = 54$
- $20 - 12 \div 3 - 8(-1) = 20 - 4 - 8(-1)$
 $= 20 - 4 + 8$
 $= 16 + 8$
 $= 24$
- $15 + 3 - 2 + (-6) = 18 + (-2) + (-6)$
 $= 16 + (-6)$
 $= 10$
- $(9 - 13)^2 + 15 \div (-3) = (-4)^2 + 15 \div (-3)$
 $= 16 + 15 \div (-3)$
 $= 16 + (-5)$
 $= 11$
- $-0.12 \div 0.6 + (-3)(1.2) - (-0.5)$
 $= -0.2 + (-3)(1.2) + 0.5$
 $= -0.2 + (-3.6) + 0.5$
 $= -3.8 + 0.5$
 $= -3.3$

$$\begin{aligned}
 22. \quad & \left(\frac{3}{4}\right)\left(-\frac{2}{5}\right) + \left(-\frac{1}{2}\right)\left(\frac{4}{5}\right) + \left(\frac{1}{2}\right)^2 \\
 &= \left(\frac{3}{4}\right)\left(-\frac{2}{5}\right) + \left(-\frac{1}{2}\right)\left(\frac{4}{5}\right) + \frac{1}{4} \\
 &= -\frac{3}{10} + \left(-\frac{1}{2}\right)\left(\frac{4}{5}\right) + \frac{1}{4} \\
 &= -\frac{3}{10} + \left(-\frac{2}{5}\right) + \frac{1}{4} \\
 &= -\frac{6}{20} + \left(-\frac{8}{20}\right) + \frac{5}{20} \\
 &= -\frac{14}{20} + \frac{5}{20} \\
 &= -\frac{9}{20}
 \end{aligned}$$

1.6 Exercises

2. When we write an expression with numbers and variables such as $7x$, it indicates that we are multiplying 7 by x .
4. It distributes a factor of a to each term inside the parentheses. Distribute means “to give out to each member of a group.”
6. She made an error with the sign rules. She should multiply $(-5)(-2)$ to get $+10$. The answer to the problem is $-5x - 15y + 10$.
8. $6(3x - 6y) = 6(3x) + 6(-6y) = 18x - 36y$
10. $-3(2a - 4b) = -3(2a) + (-3)(-4b) = -6a + 12b$
12. $8(5x + y) = 8(5x) + 8(y) = 40x + 8y$
14. $10(-2m - n) = 10(-2m) + 10(-n) = -20m - 10n$
16. $-(-3y + x) = (-1)(-3y) + (-1)(x) = 3y - x$
18. $-3(4x + 8 - 6y) = (-3)(4x) + (-3)(8) + (-3)(-6y) = -12x - 24 + 18y$
20. $1.5(2x - 6y - 5) = 1.5(2x) + 1.5(-6y) + 1.5(-5) = 3x - 9y - 7.5$
22. $\frac{2}{3}(-27a^4 + 9a^2 - 21)$
 $= \frac{2}{3}(-27a^4) + \frac{2}{3}(9a^2) + \frac{2}{3}(-21)$
 $= -18a^4 + 6a^2 - 14$

$$\begin{aligned}
 24. \quad & \frac{y}{3}(3y - 4x - 6) = \frac{y}{3}(3y) + \frac{y}{3}(-4x) + \frac{y}{3}(-6) \\
 &= y^2 - \frac{4xy}{3} - 2y
 \end{aligned}$$

$$\begin{aligned}
 26. \quad & 3a(2a + b - c) \\
 &= 3a(2a) + 3ab + 3a(-c) \\
 &= 6a^2 + 3ab - 3ac
 \end{aligned}$$

$$\begin{aligned}
 28. \quad & (-3.2x + 5)(-4) = (-3.2x)(-4) + 5(-4) \\
 &= 12.8x - 20
 \end{aligned}$$

$$\begin{aligned}
 30. \quad & (2x - 2y + 6)(3x) = 2x(3x) + (-2y)(3x) + 6(3x) \\
 &= 6x^2 - 6xy + 18x
 \end{aligned}$$

$$\begin{aligned}
 32. \quad & (5a - 3b - 1)(-ab) \\
 &= 5a(-ab) + (-3b)(-ab) + (-1)(-ab) \\
 &= -5a^2b + 3ab^2 + ab
 \end{aligned}$$

$$\begin{aligned}
 34. \quad & (2a - b - 5)3ab \\
 &= 2a(3ab) + (-b)(3ab) + (-5)(3ab) \\
 &= 6a^2b - 3ab^2 - 15ab
 \end{aligned}$$

$$\begin{aligned}
 36. \quad & \frac{1}{3}(-15a^2 - 21a + 4) \\
 &= \frac{1}{3}(-15a^2) + \frac{1}{3}(-21a) + \frac{1}{3}(4) \\
 &= -5a^2 - 7a + \frac{4}{3}
 \end{aligned}$$

$$\begin{aligned}
 38. \quad & -0.6q(1.2q^2 + 2.5r - 0.7s) \\
 &= -0.6q(1.2q^2) + (-0.6q)(2.5r) + (-0.6q)(-0.7s) \\
 &= -0.72q^3 - 1.5qr + 0.42qs
 \end{aligned}$$

$$\begin{aligned}
 40. \quad & 850(10x + 7y) = 850(10x) + 850(7y) \\
 &= 8500x + 5950y
 \end{aligned}$$

The area is $(8500x + 5950y) \text{ ft}^2$.

$$\begin{aligned}
 42. \quad & 2x(1800 + 3y) = 2x(1800) + 2x(3y) \\
 &= 3600x + 6xy
 \end{aligned}$$

The area is $(3600x + 6xy) \text{ ft}^2$.

Cumulative Review

$$\begin{aligned}
 44. \quad & -18 + (-20) + 36 + (-14) = -38 + 36 + (-14) \\
 &= -2 + (-14) \\
 &= -16
 \end{aligned}$$

$$45. \quad (-2)^6 = (-2)(-2)(-2)(-2)(-2)(-2) = 64$$

$$46. -27 - (-41) = -27 + 41 = 14$$

$$47. 25 \div 5(2) + (-6) = 5(2) + (-6) = 10 + (-6) = 4$$

$$\begin{aligned} 48. (12-10)^2 + (-3)(-2) &= (2)^2 + (-3)(-2) \\ &= 4 + (-3)(-2) \\ &= 4 + 6 \\ &= 10 \end{aligned}$$

Classroom Quiz 1.6

$$1. 6(-4x - 9y) = 6(-4x) + 6(-9y) = -24x - 54y$$

$$\begin{aligned} 2. -3x(2x + 4y - 7) \\ &= -3x(2x) + (-3x)(4y) + (-3x)(-7) \\ &= -6x^2 - 12xy + 21x \end{aligned}$$

$$\begin{aligned} 3. -4ab(-5a + 7b + 8) \\ &= -4ab(-5a) + (-4ab)(7b) + (-4ab)(8) \\ &= 20a^2b - 28ab^2 - 32ab \end{aligned}$$

1.7 Exercises

2. Like terms are terms that have identical variables and exponents.

4. The two terms $12a$ and $-9a$ are like terms because they both have the variable a with the exponent of one.

6. The only like terms are $-12ab$ and $9ab$ because the other two have different exponents even though they have the same variables.

$$8. -14x^3 - 21x^3 = (-14 - 21)x^3 = -35x^3$$

$$10. 2b^3 + 8b^2 - 9b^3 = (2 - 9)b^3 + 8b^2 = -7b^3 + 8b^2$$

$$\begin{aligned} 12. 5x - 9b - 6x - 5b &= (5 - 6)x + (-9 - 5)b \\ &= -1x + (-14)b \\ &= -x - 14b \end{aligned}$$

$$\begin{aligned} 14. 3.1a - 0.2b - 0.8a + 5.3b \\ &= (3.1 - 0.8)a + (-0.2 + 5.3)b \\ &= 2.3a + 5.1b \end{aligned}$$

$$\begin{aligned} 16. 1.9x - 2.4b - 3.8x - 8.2b \\ &= (1.9 - 3.8)x + (-2.4 - 8.2)b \\ &= -1.9x - 10.6b \end{aligned}$$

$$\begin{aligned} 18. 6x - 5y - 3y + 7 - 11x - 5 \\ &= (6 - 11)x + (-5 - 3)y + 7 - 5 \\ &= -5x - 8y + 2 \end{aligned}$$

$$\begin{aligned} 20. 7ab - 3bc - 12ac + 8ab &= (7 + 8)ab - 3bc - 12ac \\ &= 15ab - 3bc - 12ac \end{aligned}$$

$$\begin{aligned} 22. 5x + 7 - 6x^2 + 6 - 11x + 4x^2 \\ &= (-6 + 4)x^2 + (-11 + 5)x + 7 + 6 \\ &= -2x^2 - 6x + 13 \end{aligned}$$

$$\begin{aligned} 24. 3y^2 + 9y - 12 - 4y^2 - 6y + 2 \\ &= (3 - 4)y^2 + (9 - 6)y - 12 + 2 \\ &= -y^2 + 3y - 10 \end{aligned}$$

$$\begin{aligned} 26. \frac{2}{5}s - \frac{3}{8}t - \frac{4}{15}s - \frac{5}{12}t \\ &= \left(\frac{2}{5} - \frac{4}{15}\right)s + \left(-\frac{3}{8} - \frac{5}{12}\right)t \\ &= \left(\frac{6}{15} - \frac{4}{15}\right)s + \left(-\frac{9}{24} - \frac{10}{24}\right)t \\ &= \frac{2}{15}s - \frac{19}{24}t \end{aligned}$$

$$\begin{aligned} 28. \frac{2}{5}y - \frac{3}{4}x^2 - \frac{1}{3}y + \frac{7}{8}x^2 \\ &= \left(\frac{2}{5} - \frac{1}{3}\right)y + \left(-\frac{3}{4} + \frac{7}{8}\right)x^2 \\ &= \left(\frac{6}{15} - \frac{5}{15}\right)y + \left(-\frac{6}{8} + \frac{7}{8}\right)x^2 \\ &= \frac{1}{15}y + \frac{1}{8}x^2 \end{aligned}$$

$$\begin{aligned} 30. -rs + 10s + 5r - rs + 6s - 2r \\ &= (-1 - 1)rs + (10 + 6)s + (5 - 2)r \\ &= -2rs + 16s + 3r \end{aligned}$$

$$\begin{aligned} 32. \frac{3}{7}ab - \frac{2}{7}a^2b + 2ab + \frac{9}{7}a^2b \\ &= \left(\frac{3}{7} + 2\right)ab + \left(-\frac{2}{7} + \frac{9}{7}\right)a^2b \\ &= \left(\frac{3}{7} + \frac{14}{7}\right)ab + \left(-\frac{2}{7} + \frac{9}{7}\right)a^2b \\ &= \frac{17}{7}ab + \frac{7}{7}a^2b \\ &= \frac{17}{7}ab + 1a^2b \\ &= \frac{17}{7}ab + a^2b \end{aligned}$$

34. $8(3x - 2y) + 4(3y - 5x)$
 $= 24x - 16y + 12y - 20x$
 $= (24 - 20)x + (-16 + 12)y$
 $= 4x - 4y$
36. $3a(2a - 3b) - 3(-5a^2 + ab)$
 $= 6a^2 - 9ab + 15a^2 - 3ab$
 $= (6 + 15)a^2 + (-9 - 3)ab$
 $= 21a^2 - 12ab$
38. $-4(3cd + 2c^2) + 2c(5d - c)$
 $= -12cd - 8c^2 + 10cd - 2c^2$
 $= (-12 + 10)cd + (-8 - 2)c^2$
 $= -2cd - 10c^2$
40. $5(6 - x) - 2(9 - 11x) = 30 - 5x - 18 + 22x$
 $= (-5 + 22)x + (30 - 18)$
 $= 17x + 12$

42. $2(6x - 3) + 2(8x - 7) = 12x - 6 + 16x - 14$
 $= 28x - 20$

The perimeter is $(28x - 20)$ units.

44. $3a + 8 + 5a - b + 12 - 2b$
 $= (3 + 5)a + (-1 - 2)b + (8 + 12)$
 $= 8a - 3b + 20$
The perimeter is $(8a - 3b + 20)$ meters.

Cumulative Review

45. $-\frac{3}{4} - \frac{1}{3} = -\frac{9}{12} - \frac{4}{12} = -\frac{13}{12}$ or $-1\frac{1}{12}$
46. $\left(\frac{2}{3}\right)\left(-\frac{9}{16}\right) = -\frac{18}{48} = -\frac{3 \cdot 6}{8 \cdot 6} = -\frac{3}{8}$
47. $\frac{4}{5} + \left(-\frac{1}{25}\right) + \left(-\frac{3}{10}\right) = \frac{40}{50} + \left(-\frac{2}{50}\right) + \left(-\frac{15}{50}\right)$
 $= \frac{23}{50}$
48. $\left(\frac{5}{7}\right) \div \left(-\frac{14}{3}\right) = \left(\frac{5}{7}\right)\left(-\frac{3}{14}\right) = -\frac{15}{98}$

Classroom Quiz 1.7

1. $5ab - \frac{3}{5}a^2b + \frac{1}{4}ab + \frac{4}{5}a^2b$
 $= \left(5 + \frac{1}{4}\right)ab + \left(-\frac{3}{5} + \frac{4}{5}\right)a^2b$
 $= \frac{21}{4}ab + \frac{1}{5}a^2b$
2. $-6.5x^2y + 3.8xy^2 - 7.6x^2y - 6.8xy^2$
 $= (-6.5 - 7.6)x^2y + (3.8 - 6.8)xy^2$
 $= -14.1x^2y - 3xy^2$
3. $-3(5x - 2y) - 7(2x - 3y)$
 $= -15x + 6y - 14x + 21y$
 $= (-15 - 14)x + (6 + 21)y$
 $= -29x + 27y$

1.8 Exercises

2. If $x = 6$, then
 $-5x - 6 = -5(6) - 6 = -30 - 6 = -36.$
4. If $y = -6$, then
 $\frac{5}{6}y - 5 = \frac{5}{6}(-6) - 5 = -5 - 5 = -10.$
6. If $x = -\frac{3}{2}$, then $5x + 15 = 5\left(-\frac{3}{2}\right) + 15$
 $= -\frac{15}{2} + 15$
 $= -\frac{15}{2} + \frac{30}{2}$
 $= \frac{15}{2}$ or $7\frac{1}{2}.$
8. If $x = 8$, then $3 - 5x = 3 - 5(8) = 3 - 40 = -37.$
10. If $x = 2.3$, then
 $6.3 - 3x = 6.3 - 3(2.3) = 6.3 - 6.9 = -0.6.$
12. If $x = -\frac{2}{3}$, then
 $5x + 7 = 5\left(-\frac{2}{3}\right) + 7 = -\frac{10}{3} + \frac{21}{3} = \frac{11}{3}$ or $3\frac{2}{3}.$
14. If $x = 4$, then
 $x^2 + 3x = (4)^2 + 3(4) = 16 + 12 = 28.$
16. If $y = -1$, then $8y^2 = 8(-1)^2 = 8(1) = 8.$

18. If $x = 3$, then $-5x^3 = -5(3)^3 = -5(27) = -135$.

20. If $x = -3$, then $-2x^2 = -2(-3)^2 = -2(9) = -18$.

22. If $x = -3$, then
 $18 + 3x^2 = 18 + 3(-3)^2 = 18 + 3(9) = 18 + 27 = 45$.

24. If $x = -2$, then $2 - x^2 = 2 - (-2)^2 = 2 - 4 = -2$.

26. If $x = -4$, then $2x - 3x^2 = 2(-4) - 3(-4)^2$
 $= -8 - 3(16)$
 $= -8 - 48$
 $= -56$.

28. If $a = -3$, then $9a - (2a)^2 = 9(-3) - [2(-3)]^2$
 $= 9(-3) - (-6)^2$
 $= -27 - 36$
 $= -63$.

30. If $x = \frac{1}{3}$, then
 $5 - 9x^2 = 5 - 9\left(\frac{1}{3}\right)^2 = 5 - 9\left(\frac{1}{9}\right) = 5 - 1 = 4$.

32. If $a = 1$ and $b = -4$, then
 $a^3 + 2b - 4 = (1)^3 + 2(-4) - 4$
 $= 1 + 2(-4) - 4$
 $= 1 - 8 - 4$
 $= -11$.

34. If $x = -3$ and $y = \frac{3}{4}$, then
 $\frac{1}{3}x^2 + 4y - 5 = \frac{1}{3}(-3)^2 + 4\left(\frac{3}{4}\right) - 5$
 $= \frac{1}{3}(9) + 4\left(\frac{3}{4}\right) - 5$
 $= 3 + 3 - 5$
 $= 1$.

36. If $r = -2$ and $s = 3$, then
 $-r^2 + 5rs + 4s^2 = -(-2)^2 + 5(-2)(3) + 4(3)^2$
 $= -4 - 30 + 36$
 $= 2$.

38. If $a = 3$, $b = 2$, and $c = -4$, then
 $a^3 - 2ab + 2c^2 = 3^3 - 2(3)(2) + 2(-4)^2$
 $= 27 - 12 + 2(16)$
 $= 27 - 12 + 32$
 $= 47$.

40. If $x = -2$ and $y = -3$, then
 $\frac{x^2 - 2xy}{2y} = \frac{(-2)^2 - 2(-2)(-3)}{2(-3)}$
 $= \frac{4 - 12}{-6}$
 $= \frac{-8}{-6}$
 $= \frac{4}{3}$ or $1\frac{1}{3}$.

42. $A = ab$, $b = 92$, $a = 54$
 $A = (92)(54) = 4968$
The area is 4968 square feet.

44. $A = s^2$
Decrease $= A_{\text{old}} - A_{\text{new}}$
 $= (23)^2 - (20)^2$
 $= 529 - 400$
 $= 129$
The area is decreased by 129 square millimeters.

46. $A = \frac{1}{2}a(b_1 + b_2)$, $a = 9$, $b_1 = 17$, $b_2 = 20$
 $A = \frac{1}{2}(9)(20 + 17) = \frac{9(37)}{2} = 166.5$
The area is 166.5 square inches.

48. $A = \frac{1}{2}ab$, $a = 14$, $b = 19$
 $A = \frac{1}{2}(14)(19) = 133$
The area is 133 square feet.

50. $A = \frac{1}{2}ab$, $a = 400$, $b = 280$
 $A = \frac{1}{2}(400)(280) = 56,000$
The area is 56,000 square feet.

$$52. C = \frac{5}{9}(F - 32), F = -3$$

$$\begin{aligned} C &= \frac{5}{9}(-3 - 32) \\ &= \frac{5}{9}(-35) \\ &= -\frac{175}{9} \\ &= -19\frac{4}{9} \end{aligned}$$

Yes, the coat will be warm enough. Her coat is rated for $-19\frac{4}{9}$ degrees Celsius.

$$54. A = \frac{1}{2}\pi r^2, r = 14$$

$$A \approx \frac{1}{2}(3.14)(14)^2 = 307.72 \text{ square inches}$$

$$\text{Cost} = (1.15)(307.72) \approx 353.88$$

The total cost is \$353.88.

$$56. r \approx 0.62k$$

$$r \approx 0.62\left(\frac{3642}{20}\right) \approx 0.62(182.1) \approx 112.9$$

The distance was approximately 112.9 miles.

Cumulative Review

$$\begin{aligned} 57. (-2)^4 - 4 \div 2 - (-2) &= 16 - 4 \div 2 - (-2) \\ &= 16 - 2 + 2 \\ &= 16 \end{aligned}$$

$$\begin{aligned} 58. 3(x - 2y) - (x^2 - y) - (x - y) \\ &= 3x - 6y - x^2 + y - x + y \\ &= -x^2 + 2x - 4y \end{aligned}$$

Classroom Quiz 1.8

$$1. \text{ If } x = -3, \text{ then}$$

$$\begin{aligned} 3x^2 + 5x - 15 &= 3(-3)^2 + 5(-3) - 15 \\ &= 3(9) + 5(-3) - 15 \\ &= 27 - 15 - 15 \\ &= -3. \end{aligned}$$

$$2. \text{ If } a = \frac{2}{3} \text{ and } b = -\frac{1}{4}, \text{ then}$$

$$\begin{aligned} -7a + 4b &= -7\left(\frac{2}{3}\right) + 4\left(-\frac{1}{4}\right) \\ &= -\frac{14}{3} - 1 \\ &= -\frac{14}{3} - \frac{3}{3} \\ &= -\frac{17}{3} \text{ or } -5\frac{2}{3}. \end{aligned}$$

$$3. \text{ If } x = 3 \text{ and } y = -2, \text{ then}$$

$$\begin{aligned} x^3 - 2x^2y - 3y + 4 &= 3^3 - 2(3)^2(-2) - 3(-2) + 4 \\ &= 27 + 36 + 6 + 4 \\ &= 73. \end{aligned}$$

1.9 Exercises

$$2. -x + 5y = -x - (-5y) = -(x - 5y)$$

4. When an expression contains many grouping symbols, remove the innermost grouping symbol first.

$$6. -6y - 2(x - 5y) = -6y - 2x + 10y = 4y - 2x$$

$$8. 6(2c - d) - (4c + d) = 12c - 6d - 4c - d = 8c - 7d$$

$$\begin{aligned} 10. -4(x + 5y) + 3(6y - 3x) &= -4x - 20y + 18y - 9x \\ &= -13x - 2y \end{aligned}$$

$$\begin{aligned} 12. 4y[-3y^2 + 2(4 - y)] &= 4y[-3y^2 + 8 - 2y] \\ &= -12y^3 + 32y - 8y^2 \\ &= -12y^3 - 8y^2 + 32y \end{aligned}$$

$$\begin{aligned} 14. -3(x + 3y) + 2(2x + y) &= -3x - 9y + 4x + 2y \\ &= x - 7y \end{aligned}$$

$$\begin{aligned} 16. [-5(-x + 3y) - 12] - 4(2x - 3) \\ &= 5x - 15y - 12 - 8x + 12 \\ &= (5 - 8)x - 15y + (-12 + 12) \\ &= -3x - 15y \end{aligned}$$

$$\begin{aligned} 18. 3[x - y(3x + y) + y^2] &= 3[x - 3xy - y^2 + y^2] \\ &= 3[x - 3xy] \\ &= 3x - 9xy \end{aligned}$$

$$\begin{aligned} 20. 7b(3b^2 - 2b - 5) - 2b(4 - b) \\ &= 21b^3 - 14b^2 - 35b - 8b + 2b^2 \\ &= 21b^3 - 12b^2 - 43b \end{aligned}$$

$$\begin{aligned}
 22. \quad 2b^2 - 3[5b + 2b(2 - b)] &= 2b^2 - 3[5b + 4b - 2b^2] \\
 &= 2b^2 - 3[9b - 2b^2] \\
 &= 2b^2 - 27b + 6b^2 \\
 &= 8b^2 - 27b
 \end{aligned}$$

$$\begin{aligned}
 24. \quad 3a - \{-2[a - 4(3a + b)] - 2\} \\
 &= 3a - \{-2[a - 12a - 4b] - 2\} \\
 &= 3a - \{-2[-11a - 4b] - 2\} \\
 &= 3a - \{22a + 8b - 2\} \\
 &= 3a - 22a - 8b + 2 \\
 &= -19a - 8b + 2
 \end{aligned}$$

$$\begin{aligned}
 26. \quad 4\{4x^2 + 2[3x - (4 - x)]\} &= 4\{4x^2 + 2[3x - 4 + x]\} \\
 &= 4\{4x^2 + 2[4x - 4]\} \\
 &= 4\{4x^2 + 8x - 8\} \\
 &= 16x^2 + 32x - 32
 \end{aligned}$$

$$\begin{aligned}
 28. \quad -3\{x^2 - 5[x - (x - 3x^2)]\} \\
 &= -3\{x^2 - 5[x - x + 3x^2]\} \\
 &= -3\{x^2 - 5[3x^2]\} \\
 &= -3\{x^2 - 15x^2\} \\
 &= -3\{-14x^2\} \\
 &= 42x^2
 \end{aligned}$$

Cumulative Review

29. If $C = 1064.18$, then
 $F = 1.8C + 32$
 $= 1.8(1064.18) + 32$
 $= 1915.524 + 32$
 $= 1947.524$
 The melting point is 1947.52°F .
30. $A = \pi r^2$, $r = 380$
 $A \approx 3.14(380)^2 \approx 3.14(144,400) \approx 453,416$
 The area is approximately 453,416 square feet.
31. $k = 0.45p$
 If $p = 120$, $k = 0.45(120) = 54$.
 If $p = 150$, $k = 0.45(150) = 67.5$.
 Great Danes weigh on average from 54 to 67.5 kg.
32. $k = 0.45p$
 If $p = 9$, $k = 0.45(9) = 4.05$.
 If $p = 14$, $k = 0.45(14) = 6.3$.
 Miniature Pinschers weigh on average 4.05 to 6.3 kg.

Classroom Quiz 1.9

1. $3[4x - 6(2x + y)] = 3(4x - 12x - 6y)$
 $= 3(-8x - 6y)$
 $= -24x - 18y$
2. $2[x - 4(x + 2y) - 4y] = 2[x - 4x - 8y - 4y]$
 $= 2[-3x - 12y]$
 $= -6x - 24y$
3. $-3\{a^2 - 4[a - (a - 2a^2)]\}$
 $= -3\{a^2 - 4[a - a + 2a^2]\}$
 $= -3\{a^2 - 4[2a^2]\}$
 $= -3\{a^2 - 8a^2\}$
 $= -3\{-7a^2\}$
 $= 21a^2$

Career Exploration Problems

1. $P = I \times E = 12 \text{ A} \times 1.8 \text{ V} = 21.6 \text{ W}$
 The power loss is 21.6 W per conductor. Since there are two conductors, the total power loss is $2 \times 21.6 \text{ W} = 43.2 \text{ W}$.
2. $E = 3\% \times 240 \text{ V} = 0.03 \times 240 \text{ V} = 7.2 \text{ V}$
 $P = I \times E = 24 \text{ A} \times 7.2 \text{ V} = 172.8 \text{ W}$
 The power loss is 172.8 W.
3. $I = \frac{E}{R} = \frac{120 \text{ V}}{200 \text{ ohms}} = 0.6 \text{ A}$
 The amount of current flow is 0.6 A.
4. $V = L \times W \times H = 4 \text{ in.} \times 4 \text{ in.} \times 1\frac{1}{2} \text{ in.} = 24 \text{ in.}^3$
 The volume of one box is 24 in.^3 .
 volume of one box $\times 7$ boxes $= 24 \text{ in.}^3 \times 7$
 $= 168 \text{ in.}^3$
 The total volume is 168 in.^3 .

You Try It

1. a. $|5| = 5$
 b. $|-1| = 1$
 c. $|0.5| = 0.5$
 d. $\left|-\frac{1}{4}\right| = \frac{1}{4}$

- e. $|-4.57| = 4.57$
2. $-10 + (-4) = -14$
3. a. $(-5) + 11 = 6$
b. $5 + (-11) = -6$
4. $-4 + 1 + (-8) + 12 + (-3) + 5$
 $= -3 + (-8) + 12 + (-3) + 5$
 $= -11 + 12 + (-3) + 5$
 $= 1 + (-3) + 5$
 $= -2 + 5$
 $= 3$
5. $-8 - (-7) = -8 + 7 = -1$
6. a. $9(-6) = -54$
b. $24 \div (-3) = -8$
c. $-48 \div (-8) = 6$
d. $-3(-7) = 21$
7. a. $3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81$
b. $1.5^2 = 1.5 \cdot 1.5 = 2.25$
c. $\left(\frac{1}{2}\right)^4 = \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{1}{16}$
8. a. $(-2)^3 = (-2)(-2)(-2) = -8$
b. $(-4)^4 = (-4)(-4)(-4)(-4) = 256$
9. $4^2 + 2(6-3)^3 - (5-2)^2 \div 3$
 $= 4^2 + 2(3)^3 - (3)^2 \div 3$
 $= 16 + 2(27) - 9 \div 3$
 $= 16 + 54 - 9 \div 3$
 $= 16 + 54 - 3$
 $= 67$
10. a. $4(2a - 3) = 4(2a) + 4(-3) = 8a - 12$
b. $-5(5x - 1) = -5(5x) + (-5)(-1) = -25x + 5$
11. $9a^2 - 10a + 3ab + 7a - 12a^2 + 5ab$
 $= (9-12)a^2 + (-10+7)a + (3+5)ab$
 $= -3a^2 - 3a + 8ab$
12. If $x = 4$ and $y = -1$, then
 $6x^2 - xy + 3y^2 = 6(4)^2 - (4)(-1) + 3(-1)^2$
 $= 6(16) - (4)(-1) + 3(1)$
 $= 96 - (-4) + 3$
 $= 96 + 4 + 3$
 $= 103$
13. $A = \frac{1}{2}a(b_1 + b_2)$
 $= \frac{1}{2}(50)(40 + 60)$
 $= 25(100)$
 $= 2500$
The area is 2500 square feet.
14. $4\{9x - [2(x+3) - 8]\} = 4\{9x - [2x + 6 - 8]\}$
 $= 4\{9x - [2x - 2]\}$
 $= 4\{9x - 2x + 2\}$
 $= 4\{7x + 2\}$
 $= 28x + 8$

Chapter 1 Review Problems

1. $-6 + (-2) = -8$
2. $-12 + 7.8 = -4.2$
3. $5 + (-2) + (-12) = 3 + (-12) = -9$
4. $3.7 + (-1.8) = 1.9$
5. $\frac{1}{2} + \left(-\frac{5}{6}\right) = \frac{3}{6} + \left(-\frac{5}{6}\right) = -\frac{2}{6} = -\frac{1}{3}$
6. $-\frac{3}{11} + \left(-\frac{1}{22}\right) = -\frac{6}{22} + \left(-\frac{1}{22}\right) = -\frac{7}{22}$
7. $\frac{3}{4} + \left(-\frac{1}{12}\right) + \left(-\frac{1}{2}\right) = \frac{9}{12} + \left(-\frac{1}{12}\right) + \left(-\frac{6}{12}\right)$
 $= \frac{2}{12}$
 $= \frac{1}{6}$
8. $\frac{2}{15} + \frac{1}{6} + \left(-\frac{4}{5}\right) = \frac{4}{30} + \frac{5}{30} + \left(-\frac{24}{30}\right)$
 $= -\frac{15}{30}$
 $= -\frac{1}{2}$

9. $5 - (-3) = 5 + 3 = 8$

10. $-2 - (-15) = -2 + 15 = 13$

11. $-30 - (+3) = -30 + (-3) = -33$

12. $8 - (-1.2) = 8 + 1.2 = 9.2$

13. $-\frac{7}{8} + \left(-\frac{3}{4}\right) = -\frac{7}{8} + \left(-\frac{6}{8}\right) = -\frac{13}{8}$ or $-1\frac{5}{8}$

14. $-\frac{3}{8} + \frac{5}{6} = -\frac{9}{24} + \frac{20}{24} = \frac{11}{24}$

15. $-20.8 - 1.9 = -20.8 + (-1.9) = -22.7$

16. $-151 - (-63) = -151 + 63 = -88$

17. $87 \div (-29) = -3$

18. $-10.4 \div (-0.8) = 13$

19. $\frac{-24}{-\frac{3}{4}} = -24 \div \left(-\frac{3}{4}\right) = \left(\frac{-24}{1}\right)\left(-\frac{4}{3}\right) = 32$

20. $-\frac{2}{3} \div \left(-\frac{4}{5}\right) = -\frac{2}{3} \cdot \left(-\frac{5}{4}\right) = \frac{10}{12} = \frac{5}{6}$

21. $\frac{5}{7} \div \left(-\frac{5}{25}\right) = \frac{5}{7} \cdot \left(-\frac{25}{5}\right) = -\frac{25}{7}$ or $-3\frac{4}{7}$

22. $-6(3)(4) = (-18)(4) = -72$

23. $-1(-4)(-3)(-5) = 4(-3)(-5) = -12(-5) = 60$

24. $(-5)\left(-\frac{1}{2}\right)(4)(-3) = \left(\frac{5}{2}\right)(4)(-3) = 10(-3) = -30$

25. $(-3)^5 = (-3)(-3)(-3)(-3)(-3) = -243$

26. $(-2)^6 = (-2)(-2)(-2)(-2)(-2)(-2) = 64$

27. $(-5)^4 = (-5)(-5)(-5)(-5) = 625$

28. $\left(-\frac{2}{3}\right)^3 = \left(-\frac{2}{3}\right)\left(-\frac{2}{3}\right)\left(-\frac{2}{3}\right) = -\frac{8}{27}$

29. $-9^2 = -(9)(9) = -81$

30. $(0.6)^2 = (0.6)(0.6) = 0.36$

31. $\left(\frac{5}{6}\right)^2 = \left(\frac{5}{6}\right)\left(\frac{5}{6}\right) = \frac{25}{36}$

32. $\left(\frac{3}{4}\right)^3 = \left(\frac{3}{4}\right)\left(\frac{3}{4}\right)\left(\frac{3}{4}\right) = \frac{27}{64}$

33. $(5)(-4) + (3)(-2)^3 = (5)(-4) + (3)(-8)$
 $= -20 + (-24)$
 $= -44$

34. $8 \div 0.4 + 0.1 \times (0.2)^2 = 8 \div 0.4 + 0.1 \times 0.04$
 $= 20 + 0.1 \times 0.04$
 $= 20 + 0.004$
 $= 20.004$

35. $(3-6)^2 + (-12) \div (-3)(-2)$
 $= (-3)^2 + (-12) \div (-3)(-2)$
 $= 9 + (-12) \div (-3)(-2)$
 $= 9 + 4(-2)$
 $= 9 - 8$
 $= 1$

36. $7(-3x + y) = 7(-3x) + 7(y) = -21x + 7y$

37. $3x(6 - x + 3y) = 3x(6) + 3x(-x) + 3x(3y)$
 $= 18x - 3x^2 + 9xy$

38. $-(7x^2 - 3x + 11)$
 $= -1(7x^2) + (-1)(-3x) + (-1)(11)$
 $= -7x^2 + 3x - 11$

39. $(2xy + x - y)(-3y^2)$
 $= (2xy)(-3y^2) + x(-3y^2) - y(-3y^2)$
 $= -6xy^3 - 3xy^2 + 3y^3$

40. $3a^2b - 2bc + 6bc^2 - 8a^2b - 6bc^2 + 5bc$
 $= (3-8)a^2b + (-2+5)bc + (6-6)bc^2$
 $= -5a^2b + 3bc$

41. $9x + 11y - 12x - 15y = -3x - 4y$

42. $4x^2 - 13x + 7 - 9x^2 - 22x - 16$
 $= (4-9)x^2 + (-13-22)x + 7-16$
 $= -5x^2 - 35x - 9$

$$\begin{aligned}
 43. \quad & -x + \frac{1}{2} + 14x^2 - 7x - 1 - 4x^2 \\
 & = (14 - 4)x^2 + (-7 - 1)x + \frac{1}{2} - 1 \\
 & = 10x^2 - 8x - \frac{1}{2}
 \end{aligned}$$

$$\begin{aligned}
 44. \quad & \text{If } x = -7, \text{ then} \\
 & 7x - 6 = 7(-7) - 6 = -49 - 6 = -55.
 \end{aligned}$$

$$45. \quad \text{If } x = 8, \text{ then } 7 - \frac{3}{4}x = 7 - \frac{3}{4}(8) = 7 - 6 = 1.$$

$$\begin{aligned}
 46. \quad & \text{If } x = -3, \text{ then} \\
 & x^2 + 3x - 4 = (-3)^2 + 3(-3) - 4 \\
 & = 9 - 9 - 4 \\
 & = -4.
 \end{aligned}$$

$$\begin{aligned}
 47. \quad & \text{If } x = 3, \text{ then} \\
 & -x^2 + 5x - 9 = -3^2 + 5(3) - 9 = -9 + 15 - 9 = -3.
 \end{aligned}$$

$$\begin{aligned}
 48. \quad & \text{If } x = -1, \text{ then} \\
 & 2x^3 - x^2 + 6x + 9 = 2(-1)^3 - (-1)^2 + 6(-1) + 9 \\
 & = -2 - 1 - 6 + 9 \\
 & = 0.
 \end{aligned}$$

$$\begin{aligned}
 49. \quad & \text{If } a = -1, b = 5, \text{ and } c = -2, \text{ then} \\
 & b^2 - 4ac = (5)^2 - 4(-1)(-2) = 25 - 8 = 17.
 \end{aligned}$$

$$\begin{aligned}
 50. \quad & \text{If } m = -4, M = 15, G = -1, \text{ and } r = -2, \text{ then} \\
 & \frac{mMG}{r^2} = \frac{-4(15)(-1)}{(-2)^2} = \frac{60}{4} = 15.
 \end{aligned}$$

$$51. \quad \text{If } p = 6000, r = 18\%, \text{ and } t = \frac{3}{4}, \text{ then}$$

$$I = prt = 6000(0.18)\left(\frac{3}{4}\right) = 810.$$

The interest is \$810.

$$\begin{aligned}
 52. \quad F &= \frac{9C + 160}{5} \\
 &= \frac{9(20) + 160}{5} \\
 &= \frac{180 + 160}{5} \\
 &= \frac{340}{5} \\
 &= 68
 \end{aligned}$$

$$\begin{aligned}
 F &= \frac{9C + 160}{5} \\
 &= \frac{9(25) + 160}{5} \\
 &= \frac{225 + 160}{5} \\
 &= \frac{385}{5} \\
 &= 77
 \end{aligned}$$

The range is 68°F to 77°F.

$$\begin{aligned}
 53. \quad & \text{If } r = 4, A = \pi r^2 \\
 & \approx 3.14(4)^2 \\
 & \approx 3.14(16) \\
 & \approx 50.24 \text{ square feet.}
 \end{aligned}$$

$$\text{Cost} = (50.24 \text{ sq ft})(\$1.50/\text{sq ft}) = \$75.36$$

The total cost is \$75.36.

$$\begin{aligned}
 54. \quad P &= 180S - R - C \\
 &= 180(56) - 300 - 1200 \\
 &= 10,080 - 300 - 1200 \\
 &= 8580
 \end{aligned}$$

The daily profit is \$8580.

$$55. \quad A = \frac{1}{2}a(b_1 + b_2), \quad a = 200, \quad b_1 = 700, \quad b_2 = 300$$

$$\begin{aligned}
 A &= \frac{1}{2}(200)(700 + 300) \\
 &= 100(1000) \\
 &= 100,000
 \end{aligned}$$

$$\text{Cost} = 2(100,000) = 200,000$$

The area is 100,000 ft² and the cost is \$200,000.

$$56. \quad A = \frac{1}{2}ab, \quad a = 3.8, \quad b = 5.5$$

$$A = \frac{1}{2}(3.8)(5.5) = 10.45$$

$$\text{Cost} = 66(10.45) = 689.70$$

The area is 10.45 ft² and the cost is \$689.70.

$$57. \quad 5x - 7(x - 6) = 5x - 7x + 42 = -2x + 42$$

$$\begin{aligned}
 58. \quad 3(x - 2) - 4(5x + 3) &= 3x - 6 - 20x - 12 \\
 &= -17x - 18
 \end{aligned}$$

$$\begin{aligned}
 59. \quad 2[3 - (4 - 5x)] &= 2(3 - 4 + 5x) \\
 &= 2(-1 + 5x) \\
 &= -2 + 10x
 \end{aligned}$$

$$\begin{aligned} 60. \quad & -3x[x + 3(x - 7)] = -3x(x + 3x - 21) \\ & = -3x(4x - 21) \\ & = -12x^2 + 63x \end{aligned}$$

$$\begin{aligned} 61. \quad & 2xy^3 - 6x^3y - 4x^2y^2 + 3(xy^3 - 2x^2y - 3x^2y^2) \\ & = 2xy^3 - 6x^3y - 4x^2y^2 + 3xy^3 - 6x^2y - 9x^2y^2 \\ & = (2+3)xy^3 - 6x^3y + (-4-9)x^2y^2 - 6x^2y \\ & = 5xy^3 - 6x^3y - 13x^2y^2 - 6x^2y \end{aligned}$$

$$\begin{aligned} 62. \quad & -5(x + 2y - 7) + 3x(2 - 5y) \\ & = -5x - 10y + 35 + 6x - 15xy \\ & = x - 10y + 35 - 15xy \end{aligned}$$

$$\begin{aligned} 63. \quad & -(a + 3b) + 5[2a - b - 2(4a - b)] \\ & = -(a + 3b) + 5(2a - b - 8a + 2b) \\ & = -(a + 3b) + 5(-6a + b) \\ & = -a - 3b - 30a + 5b \\ & = -31a + 2b \end{aligned}$$

$$\begin{aligned} 64. \quad & -5\{2a - [5a - b(3 + 2a)]\} \\ & = -5\{2a - [5a - 3b - 2ab]\} \\ & = -5\{2a - 5a + 3b + 2ab\} \\ & = -5\{-3a + 3b + 2ab\} \\ & = 15a - 15b - 10ab \end{aligned}$$

$$\begin{aligned} 65. \quad & -3\{2x - [x - 3y(x - 2y)]\} \\ & = -3\{2x - (x - 3xy + 6y^2)\} \\ & = -3(2x - x + 3xy - 6y^2) \\ & = -3(x + 3xy - 6y^2) \\ & = -3x - 9xy + 18y^2 \end{aligned}$$

$$\begin{aligned} 66. \quad & 2\{3x + 2[x + 2y(x - 4)]\} \\ & = 2\{3x + 2(x + 2xy - 8y)\} \\ & = 2(3x + 2x + 4xy - 16y) \\ & = 2(5x + 4xy - 16y) \\ & = 10x + 8xy - 32y \end{aligned}$$

$$67. \quad -6.3 + 4 = -2.3$$

$$68. \quad 4 + (-8) + 12 = -4 + 12 = 8$$

$$69. \quad -\frac{2}{3} - \frac{4}{5} = -\frac{10}{15} + \left(-\frac{12}{15}\right) = -\frac{22}{15} \text{ or } -1\frac{7}{15}$$

$$70. \quad -\frac{7}{8} - \left(-\frac{3}{4}\right) = -\frac{7}{8} + \frac{6}{8} = -\frac{1}{8}$$

$$71. \quad 3 - (-4) + (-8) = 3 + 4 + (-8) = 7 + (-8) = -1$$

$$\begin{aligned} 72. \quad & -1.1 - (-0.2) + 0.4 = -1.1 + 0.2 + 0.4 \\ & = -0.9 + 0.4 \\ & = -0.5 \end{aligned}$$

$$73. \quad \left(-\frac{9}{10}\right)\left(-2\frac{1}{4}\right) = \left(-\frac{9}{10}\right)\left(-\frac{9}{4}\right) = \frac{81}{40} \text{ or } 2\frac{1}{40}$$

$$74. \quad 3.6 \div (-0.45) = -8$$

$$75. \quad -14.4 \div (-0.06) = 240$$

$$76. \quad (-8.2)(3.1) = -25.42$$

$$77. \quad 400 + 1000 - 800 = 1400 - 800 = 600$$

Her score was \$600.

$$78. \quad (-0.3)^4 = (-0.3)(-0.3)(-0.3)(-0.3) = 0.0081$$

$$79. \quad -0.5^4 = -(0.5)(0.5)(0.5)(0.5) = -0.0625$$

$$\begin{aligned} 80. \quad & 9(5) - 5(2)^3 + 5 = 9(5) - 5(8) + 5 \\ & = 45 - 5(8) + 5 \\ & = 45 - 40 + 5 \\ & = 5 + 5 \\ & = 10 \end{aligned}$$

$$\begin{aligned} 81. \quad & 3.8x - 0.2y - 8.7x + 4.3y \\ & = (3.8 - 8.7)x + (-0.2 + 4.3)y \\ & = -4.9x + 4.1y \end{aligned}$$

$$\begin{aligned} 82. \quad & \text{If } p = -2 \text{ and } q = 3, \text{ then} \\ & \frac{2p + q}{3q} = \frac{2(-2) + 3}{3(3)} = \frac{-4 + 3}{9} = -\frac{1}{9}. \end{aligned}$$

$$\begin{aligned} 83. \quad & \text{If } s = -3 \text{ and } t = -2, \text{ then} \\ & \frac{4s - 7t}{s} = \frac{4(-3) - 7(-2)}{-3} = \frac{-12 + 14}{-3} = -\frac{2}{3}. \end{aligned}$$

$$84. \quad F = \frac{9}{5}C + 32, \quad C = 38.6$$

$$F = \frac{9}{5}(38.6) + 32$$

$$F = 69.48 + 32$$

$$F = 101.48^\circ$$

Your dog does not have a fever; in fact, its temperature is below normal.

$$\begin{aligned} 85. \quad & -7(x - 3y^2 + 4) + 3y(4 - 6y) \\ & = -7x + 21y^2 - 28 + 12y - 18y^2 \\ & = -7x + 3y^2 + 12y - 28 \end{aligned}$$

$$\begin{aligned}
 86. & -2\{6x - 3[7y - 2y(3 - x)]\} \\
 & = -2\{6x - 3[7y - 6y + 2xy]\} \\
 & = -2\{6x - 3[y + 2xy]\} \\
 & = -2\{6x - 3y - 6xy\} \\
 & = -12x + 6y + 12xy
 \end{aligned}$$

How Am I Doing? Chapter 1 Test

$$1. -2.5 + 6.3 + (-4.1) = 3.8 + (-4.1) = -0.3$$

$$2. -5 - (-7) = -5 + 7 = 2$$

$$3. \left(-\frac{2}{3}\right)(7) = -\frac{14}{3} = -4\frac{2}{3}$$

$$4. -5(-2)(7)(-1) = -(10)(7)(1) = -(70)(1) = -70$$

$$5. -12 \div (-3) = 4$$

$$6. -1.8 \div (0.6) = -3$$

$$7. (-4)^3 = (-4)(-4)(-4) = -64$$

$$8. (1.6)^2 = (1.6)(1.6) = 2.56$$

$$9. \left(\frac{2}{3}\right)^4 = \left(\frac{2}{3}\right)\left(\frac{2}{3}\right)\left(\frac{2}{3}\right)\left(\frac{2}{3}\right) = \frac{16}{81}$$

$$\begin{aligned}
 10. & (0.2)^2 - (2.1)(-3) + 0.46 \\
 & = 0.04 - (2.1)(-3) + 0.46 \\
 & = 0.04 - (-6.3) + 0.46 \\
 & = 0.04 + 6.3 + 0.46 \\
 & = 6.34 + 0.46 \\
 & = 6.8
 \end{aligned}$$

$$\begin{aligned}
 11. & 3(4 - 6)^3 + 12 \div (-4) + 2 \\
 & = 3(-2)^3 + 12 \div (-4) + 2 \\
 & = 3(-8) + 12 \div (-4) + 2 \\
 & = -24 + (-3) + 2 \\
 & = -25
 \end{aligned}$$

$$\begin{aligned}
 12. & -5x(x + 2y - 7) = -5x(x) - 5x(2y) - 5x(-7) \\
 & = -5x^2 - 10xy + 35x
 \end{aligned}$$

$$\begin{aligned}
 13. & -2ab^2(-3a - 2b + 7ab) \\
 & = -2ab^2(-3a) - 2ab^2(-2b) - 2ab^2(7ab) \\
 & = 6a^2b^2 + 4ab^3 - 14a^2b^3
 \end{aligned}$$

$$\begin{aligned}
 14. & 6ab - \frac{1}{2}a^2b + \frac{3}{2}ab + \frac{5}{2}a^2b \\
 & = \left(6 + \frac{3}{2}\right)ab + \left(-\frac{1}{2} + \frac{5}{2}\right)a^2b \\
 & = \left(\frac{12}{2} + \frac{3}{2}\right)ab + \frac{4}{2}a^2b \\
 & = \frac{15}{2}ab + 2a^2b
 \end{aligned}$$

$$\begin{aligned}
 15. & 2.3x^2y - 8.1xy^2 + 3.4xy^2 - 4.1x^2y \\
 & = (2.3 - 4.1)x^2y + (-8.1 + 3.4)xy^2 \\
 & = -1.8x^2y - 4.7xy^2
 \end{aligned}$$

$$\begin{aligned}
 16. & 3(2 - a) - 4(-6 - 2a) = 6 - 3a + 24 + 8a \\
 & = 5a + 30
 \end{aligned}$$

$$\begin{aligned}
 17. & 5(3x - 2y) - (x + 6y) = 15x - 10y - x - 6y \\
 & = (15 - 1)x + (-10 - 6)y \\
 & = 14x - 16y
 \end{aligned}$$

$$\begin{aligned}
 18. & \text{If } x = 3 \text{ and } y = -4, \text{ then} \\
 & x^3 - 3x^2y + 2y - 5 = 3^3 - 3(3)^2(-4) + 2(-4) - 5 \\
 & = 27 - 3(9)(-4) - 8 - 5 \\
 & = 27 + 108 - 8 - 5 \\
 & = 122.
 \end{aligned}$$

$$\begin{aligned}
 19. & \text{If } x = -3, \text{ then} \\
 & 3x^2 - 7x - 11 = 3(-3)^2 - 7(-3) - 11 \\
 & = 3(9) - 7(-3) - 11 \\
 & = 27 + 21 - 11 \\
 & = 37.
 \end{aligned}$$

$$\begin{aligned}
 20. & \text{If } a = \frac{1}{3} \text{ and } b = -\frac{1}{2}, \text{ then} \\
 & 2a - 3b = 2\left(\frac{1}{3}\right) - 3\left(-\frac{1}{2}\right) \\
 & = \frac{2}{3} + \frac{3}{2} \\
 & = \frac{4}{6} + \frac{9}{6} \\
 & = \frac{13}{6} \text{ or } 2\frac{1}{6}.
 \end{aligned}$$

$$\begin{aligned}
 21. & k = 1.61r = 1.61(60) = 96.6 \\
 & \text{You are traveling at 96.6 kilometers per hour.}
 \end{aligned}$$

22. $A = \frac{1}{2}a(b_1 + b_2)$, $a = 120$, $b_1 = 200$, $b_2 = 180$

$$\begin{aligned}A &= \frac{1}{2}(120)(200 + 180) \\&= 60(380) \\&= 22,800\end{aligned}$$

The area is 22,800 square feet.

23. $A = \frac{1}{2}ab$, $a = 6.8$, $b = 8.5$

$$A = \frac{1}{2}(6.8)(8.5) = 28.9$$

$$\text{Cost} = 0.80(28.9) = 23.12$$

The cost is \$23.12.

24. $A = 60 \times 10 = 600$

$$600 \text{ sq ft} \times \frac{1 \text{ can}}{200 \text{ sq ft}} = 3 \text{ cans}$$

You should buy 3 cans.

$$\begin{aligned}25. \quad 3[x - 2y(x + 2y) - 3y^2] &= 3[x - 2xy - 4y^2 - 3y^2] \\&= 3[x - 2xy - 7y^2] \\&= 3x - 6xy - 21y^2\end{aligned}$$

$$\begin{aligned}26. \quad -3\{a + b[3a - b(1 - a)]\} &= -3[a + b(3a - b + ab)] \\&= -3(a + 3ab - b^2 + ab^2) \\&= -3a - 9ab + 3b^2 - 3ab^2\end{aligned}$$