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. $5 + (-9) + (-2) = -4 + (-2) = -6$

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. $38 + (-15) + (-6) = 23 + (-6) = 17$

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. $\dfrac{15}{16} + \dfrac{1}{4} = \dfrac{15}{16} + \dfrac{4}{16} = \dfrac{19}{16}$ or $1\dfrac{3}{16}$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

58. $-23 - (-12) - (-4) + 17 = -23 + 12 + 4 + 17$
$$= -11 + 4 + 17$$
$$= -7 + 17$$
$$= 10$$

60. $-8.3 - (-2.6) + 1.9 = -8.3 + 2.6 + 1.9$
$$= -5.7 + 1.9$$
$$= -3.8$$

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

There were $6\dfrac{2}{3}$ 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. $\dfrac{2}{9} - \left(-\dfrac{3}{5}\right) = \dfrac{2}{9} + \dfrac{3}{5} = \dfrac{10}{45} + \dfrac{27}{45} = \dfrac{37}{45}$

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

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

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

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

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

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

26. $-0.6 \div 0.3 = \dfrac{-0.6}{0.3} = -2$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

66. $90(42.80 - 44.03) = 90(-1.23) = -110.7$
That day had a loss of $110.70.

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

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

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

Classroom Quiz 1.3

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

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

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

1.4 Exercises

2. 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. $(-5)^4 = (-5)(-5)(-5)(-5) = 625$

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

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

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

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

48. $(-11) + (-13) + 6 + (-9) + 8 = -24 + 6 + (-9) + 8$
$$= -18 + (-9) + 8$$
$$= -27 + 8$$
$$= -19$$

49. $\dfrac{3}{4} \div \left(-\dfrac{9}{20}\right) = \left(\dfrac{3}{4}\right)\left(-\dfrac{20}{9}\right)$
$$= \left(\dfrac{3}{4}\right)\left(-\dfrac{4 \cdot 5}{3 \cdot 3}\right)$$
$$= -\dfrac{5}{3} \text{ or } -1\dfrac{2}{3}$$

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

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

52. 6% 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. $\left(\dfrac{2}{5}\right)^4 = \left(\dfrac{2}{5}\right)\left(\dfrac{2}{5}\right)\left(\dfrac{2}{5}\right)\left(\dfrac{2}{5}\right) = \dfrac{16}{625}$

1.5 Exercises

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

4. (b) gives the correct total.

6. $(5 - 8)^2 \div 3 \times 6 = (-3)^2 \div 3 \times 6$
$$= 9 \div 3 \times 6$$
$$= 3 \times 6$$
$$= 18$$

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

10. $7 - 3^2 \cdot 4 + 5 = 7 - 9 \cdot 4 + 5$
$$= 7 - 36 + 5$$
$$= -29 + 5$$
$$= -24$$

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

14. $2 \cdot 6 + 5 \cdot 3 - 7 \cdot 4 = 12 + 5 \cdot 3 - 7 \cdot 4$
$$= 12 + 15 - 7 \cdot 4$$
$$= 12 + 15 - 28$$
$$= -1$$

16. $11 - 3(4)^2 \div (-6) = 11 - 3(16) \div (-6)$
$$= 11 - 48 \div (-6)$$
$$= 11 + 8$$
$$= 19$$

18. $-2(3 - 6)^2 - (-2) = -2(-3)^2 + 2$
$$= -2(9) + 2$$
$$= -18 + 2$$
$$= -16$$

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

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

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

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

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

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

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

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

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

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

Cumulative Review

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

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

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

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

Classroom Quiz 1.5

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

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

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

Use Math to Save Money

1. $(\$2500 \times 0.05) \times 12 = \$1500$

2. $(\$2500 \times 0.15) \times 12 = \$4500$

3. $\$3000 + \$450 = \$3450$

4. $\$2500 \times 0.05 = \$125$
   $\$3450 \div \$125 = 27.6 \approx 28$ months
   He will need to save for 28 months or 2 years,
   4 months.

5. $\$2500 \times 0.10 = \$250$
   $\$3450 \div \$250 = 13.8 \approx 14$ months
   He will need to save for 14 months or 1 year,
   2 months.

6. $\left[2500 + \left(\dfrac{5800}{12}\right)\right] \times 0.05 = \$149.17$ per month

7. $\left[2500 + \left(\dfrac{5800}{12}\right)\right] \times 0.20 = \$596.67$ per month

8. Answers will vary.

9. Answers will vary.

10. Answers will vary.

How Am I Doing? Sections 1.1–1.5
(Available online through MyMathLab or from the
Instructor's Resource Center.)

1. $3 + (-12) = -9$

2. $-\dfrac{5}{6} + \left(-\dfrac{7}{8}\right) = -\dfrac{20}{24} + \left(-\dfrac{21}{24}\right) = \dfrac{-41}{24} = -1\dfrac{17}{24}$

3. $\begin{array}{r} 0.34 \\ + \ 0.90 \\ \hline 1.24 \end{array}$

4. $-3.5 + 9 + 2.3 + (-3) = 5.5 + 2.3 + (-3)$
   $= 7.8 + (-3)$
   $= 4.8$

5. $-23 - (-34) = -23 + 34 = 11$

6. $-\dfrac{1}{6} - \dfrac{4}{5} = -\dfrac{1}{6} + \left(-\dfrac{4}{5}\right) = -\dfrac{5}{30} + \left(-\dfrac{24}{30}\right) = -\dfrac{29}{30}$

7. $4.5 - (-7.8) = 4.5 + 7.8 = 12.3$

8. $-4 - (-5) + 9 = -4 + 5 + 9 = 10$

9. $(-3)(-8)(2)(-2) = 24(2)(-2) = 48(-2) = -96$

10. $\left(-\dfrac{6}{11}\right)\left(-\dfrac{5}{3}\right) = \dfrac{10}{11}$

11. $-0.072 \div 0.08 = \dfrac{-0.072}{0.08} = -0.9$

12. $\dfrac{5}{8} \div \left(-\dfrac{17}{16}\right) = \left(\dfrac{5}{8}\right) \cdot \left(-\dfrac{16}{17}\right) = -\dfrac{10}{17}$

13. $(0.7)^3 = (0.7)(0.7)(0.7) = 0.343$

14. $(-4)^4 = (-4)(-4)(-4)(-4) = 256$

15. $-2^8 = -(2)(2)(2)(2)(2)(2)(2)(2) = -256$

16. $\left(\dfrac{2}{3}\right)^3 = \left(\dfrac{2}{3}\right)\left(\dfrac{2}{3}\right)\left(\dfrac{2}{3}\right) = \dfrac{8}{27}$

17. $-3^3 + 3^4 = -27 + 81 = 54$

18. $20 - 12 \div 3 - 8(-1) = 20 - 4 - 8(-1)$
    $= 20 - 4 + 8$
    $= 16 + 8$
    $= 24$

19. $15 + 3 - 2 + (-6) = 18 + (-2) + (-6)$
    $= 16 + (-6)$
    $= 10$

20. $(9 - 13)^2 + 15 \div (-3) = (-4)^2 + 15 \div (-3)$
    $= 16 + 15 \div (-3)$
    $= 16 + (-5)$
    $= 11$

21. $-0.12 \div 0.6 + (-3)(1.2) - (-0.5)$
    $= -0.2 + (-3)(1.2) + 0.5$
    $= -0.2 + (-3.6) + 0.5$
    $= -3.8 + 0.5$
    $= -3.3$

22. $\left(\dfrac{3}{4}\right)\left(-\dfrac{2}{5}\right)+\left(-\dfrac{1}{2}\right)\left(\dfrac{4}{5}\right)+\left(\dfrac{1}{2}\right)^2$

$=\left(\dfrac{3}{4}\right)\left(-\dfrac{2}{5}\right)+\left(-\dfrac{1}{2}\right)\left(\dfrac{4}{5}\right)+\dfrac{1}{4}$

$=-\dfrac{3}{10}+\left(-\dfrac{1}{2}\right)\left(\dfrac{4}{5}\right)+\dfrac{1}{4}$

$=-\dfrac{3}{10}+\left(-\dfrac{2}{5}\right)+\dfrac{1}{4}$

$=-\dfrac{6}{20}+\left(-\dfrac{8}{20}\right)+\dfrac{5}{20}$

$=-\dfrac{14}{20}+\dfrac{5}{20}$

$=-\dfrac{9}{20}$

1.6 Exercises

2. When we write an expression with numbers and variables such as $7x$, it indicates that we are <u>multiplying</u> 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. $3(2x - 6y - 5) = 3(2x) + 3(-6y) + 3(-5)$
$= 6x - 18y - 15$

22. $\dfrac{2}{3}(-27a^4 + 9a^2 - 21)$

$=\dfrac{2}{3}(-27a^4) + \dfrac{2}{3}(9a^2) + \dfrac{2}{3}(-21)$

$=-18a^4 + 6a^2 - 14$

24. $\dfrac{y}{3}(3y - 4x - 6) = \dfrac{y}{3}(3y) + \dfrac{y}{3}(-4x) + \dfrac{y}{3}(-6)$

$= y^2 - \dfrac{4xy}{3} - 2y$

26. $3a(2a + b - c)$
$= 3a(2a) + 3ab + 3a(-c)$
$= 6a^2 + 3ab - 3ac$

28. $(-3.2x + 5)(-4) = (-3.2x)(-4) + 5(-4)$
$= 12.8x - 20$

30. $(2x - 2y + 6)(3x) = 2x(3x) + (-2y)(3x) + 6(3x)$
$= 6x^2 - 6xy + 18x$

32. $(5a - 3b - 1)(-ab)$
$= 5a(-ab) + (-3b)(-ab) + (-1)(-ab)$
$= -5a^2b + 3ab^2 + ab$

34. $(2a - b - 5)3ab$
$= 2a(3ab) + (-b)(3ab) + (-5)(3ab)$
$= 6a^2b - 3ab^2 - 15ab$

36. $\dfrac{1}{3}(-15a^2 - 21a + 4)$

$=\dfrac{1}{3}(-15a^2) + \dfrac{1}{3}(-21a) + \dfrac{1}{3}(4)$

$=-5a^2 - 7a + \dfrac{4}{3}$

38. $-0.6q(1.2q^2 + 2.5r - 0.7s)$
$= -0.6q(1.2q^2) + (-0.6q)(2.5r) + (-0.6q)(-0.7s)$
$= -0.72q^3 - 1.5qr + 0.42qs$

40. $850(10x + 7y) = 850(10x) + 850(7y)$
$= 8500x + 5950y$

The area is $(8500x + 5950y)$ ft^2.

42. $2x(1800 + 3y) = 2x(1800) + 2x(3y)$
$= 3600x + 6xy$

The area is $(3600x + 6xy)$ ft^2.

Cumulative Review

44. $-18 + (-20) + 36 + (-14) = -38 + 36 + (-14)$
$= -2 + (-14)$
$= -16$

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

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

47. $25\div5(2)+(-6)=5(2)+(-6)=10+(-6)=4$

48. $(12-10)^2+(-3)(-2)=(2)^2+(-3)(-2)$
$$=4+(-3)(-2)$$
$$=4+6$$
$$=10$$

Classroom Quiz 1.6

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

2. $-3x(2x+4y-7)$
$$=-3x(2x)+(-3x)(4y)+(-3x)(-7)$$
$$=-6x^2-12xy+21x$$

3. $-4ab(-5a+7b+8)$
$$=-4ab(-5a)+(-4ab)(7b)+(-4ab)(8)$$
$$=20a^2b-28ab^2-32ab$$

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

12. $5x-9b-6x-5b=(5-6)x+(-9-5)b$
$$=-1x+(-14)b$$
$$=-x-14b$$

14. $3.1a-0.2b-0.8a+5.3b$
$$=(3.1-0.8)a+(-0.2+5.3)b$$
$$=2.3a+5.1b$$

16. $1.9x-2.4b-3.8x-8.2b$
$$=(1.9-3.8)x+(-2.4-8.2)b$$
$$=-1.9x-10.6b$$

18. $6x-5y-3y+7-11x-5$
$$=(6-11)x+(-5-3)y+7-5$$
$$=-5x-8y+2$$

20. $7ab-3bc-12ac+8ab=(7+8)ab-3bc-12ac$
$$=15ab-3bc-12ac$$

22. $5x+7-6x^2+6-11x+4x^2$
$$=(-6+4)x^2+(-11+5)x+7+6$$
$$=-2x^2-6x+13$$

24. $3y^2+9y-12-4y^2-6y+2$
$$=(3-4)y^2+(9-6)y-12+2$$
$$=-y^2+3y-10$$

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

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

30. $-rs+10s+5r-rs+6s-2r$
$$=(-1-1)rs+(10+6)s+(5-2)r$$
$$=-2rs+16s+3r$$

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

　　　　Copyright © 2017 Pearson Education, Inc.

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. $-\dfrac{3}{4} - \dfrac{1}{3} = -\dfrac{9}{12} - \dfrac{4}{12} = -\dfrac{13}{12}$ or $-1\dfrac{1}{12}$

46. $\left(\dfrac{2}{3}\right)\left(-\dfrac{9}{16}\right) = -\dfrac{18}{48} = -\dfrac{3 \cdot 6}{8 \cdot 6} = -\dfrac{3}{8}$

47. $\dfrac{4}{5} + \left(-\dfrac{1}{25}\right) + \left(-\dfrac{3}{10}\right) = \dfrac{40}{50} + \left(-\dfrac{2}{50}\right) + \left(-\dfrac{15}{50}\right)$
$= \dfrac{23}{50}$

48. $\left(\dfrac{5}{7}\right) \div \left(-\dfrac{14}{3}\right) = \left(\dfrac{5}{7}\right)\left(-\dfrac{3}{14}\right) = -\dfrac{15}{98}$

Classroom Quiz 1.7

1. $5ab - \dfrac{3}{5}a^2b + \dfrac{1}{4}ab + \dfrac{4}{5}a^2b$
$= \left(5 + \dfrac{1}{4}\right)ab + \left(-\dfrac{3}{5} + \dfrac{4}{5}\right)a^2b$
$= \dfrac{21}{4}ab + \dfrac{1}{5}a^2b$

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
$\dfrac{5}{6}y - 5 = \dfrac{5}{6}(-6) - 5 = -5 - 5 = -10$.

6. If $x = -\dfrac{3}{2}$, then $5x + 15 = 5\left(-\dfrac{3}{2}\right) + 15$
$= -\dfrac{15}{2} + 15$
$= -\dfrac{15}{2} + \dfrac{30}{2}$
$= \dfrac{15}{2}$ or $7\dfrac{1}{2}$.

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 $x = -\dfrac{2}{3}$, then
$5x + 7 = 5\left(-\dfrac{2}{3}\right) + 7 = -\dfrac{10}{3} + \dfrac{21}{3} = \dfrac{11}{3}$ or $3\dfrac{2}{3}$.

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 $x = \dfrac{1}{3}$, 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 $y = \dfrac{3}{4}$, then

$\dfrac{1}{3}x^2 + 4y - 5 = \dfrac{1}{3}(-3)^2 + 4\left(\dfrac{3}{4}\right) - 5$
$$= \frac{1}{3}(9) + 4\left(\frac{3}{4}\right) - 5$$
$$= 3 + 3 - 5$$
$$= 1.$$

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

$\dfrac{x^2 - 2xy}{2y} = \dfrac{(-2)^2 - 2(-2)(-3)}{2(-3)}$
$$= \frac{4 - 12}{-6}$$
$$= \frac{-8}{-6}$$
$$= \frac{4}{3} \text{ or } 1\frac{1}{3}.$$

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. $A = \dfrac{1}{2}a(b_1 + b_2)$, $a = 9$, $b_1 = 17$, $b_2 = 20$

$A = \dfrac{1}{2}(9)(20 + 17) = \dfrac{9(37)}{2} = 166.5$
The area is 166.5 square inches.

48. $A = \dfrac{1}{2}ab$, $a = 14$, $b = 19$

$A = \dfrac{1}{2}(14)(19) = 133$
The area is 133 square feet.

50. $A = \pi r^2$, $r = \dfrac{d}{2} = \dfrac{12}{2} = 6$

$A \approx (3.14)(6)^2$
$$\approx (3.14)(36)$$
$$\approx 113.04$$
The area is approximately 113.04 square feet.

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

$C = \dfrac{5}{9}(-3 - 32)$

$ = \dfrac{5}{9}(-35)$

$ = -\dfrac{175}{9}$

$ = -19\dfrac{4}{9}$

Yes, the coat will be warm enough. Her coat is

rated for $-19\dfrac{4}{9}$ degrees Celsius.

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

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

$\text{Cost} = (1.15)(307.72) \approx 353.88$
The total cost is \$353.88.

56. $r \approx 0.62k$

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

The distance was approximately 112.9 miles.

Cumulative Review

57. $(-2)^4 - 4 \div 2 - (-2) = 16 - 4 \div 2 - (-2)$
$ = 16 - 2 + 2$
$ = 16$

58. $3(x - 2y) - (x^2 - y) - (x - y)$
$= 3x - 6y - x^2 + y - x + y$
$= -x^2 + 2x - 4y$

Classroom Quiz 1.8

1. If $x = -3$, then
$3x^2 + 5x - 15 = 3(-3)^2 + 5(-3) - 15$
$ = 3(9) + 5(-3) - 15$
$ = 27 - 15 - 15$
$ = -3.$

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

$-7a + 4b = -7\left(\dfrac{2}{3}\right) + 4\left(-\dfrac{1}{4}\right)$

$ = -\dfrac{14}{3} - 1$

$ = -\dfrac{14}{3} - \dfrac{3}{3}$

$ = -\dfrac{17}{3} \text{ or } -5\dfrac{2}{3}.$

3. If $x = 3$ and $y = -2$, then
$x^3 - 2x^2y - 3y + 4 = 3^3 - 2(3)^2(-2) - 3(-2) + 4$
$ = 27 + 36 + 6 + 4$
$ = 73.$

1.9 Exercises

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

4. When an expression contains many grouping symbols, remove the <u>innermost</u> grouping symbol first.

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

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

10. $-4(x + 5y) + 3(6y - 3x) = -4x - 20y + 18y - 9x$
$ = -13x - 2y$

12. $4y[-3y^2 + 2(4 - y)] = 4y[-3y^2 + 8 - 2y]$
$ = -12y^3 + 32y - 8y^2$
$ = -12y^3 - 8y^2 + 32y$

14. $-3[2(3a + b) - 5(a - 2b)]$
$= -3[6a + 2b - 5a + 10b]$
$= -3[a + 12b]$
$= -3a - 36b$

16. $[-5(-x + 3y) - 12] - 4(2x - 3)$
$= 5x - 15y - 12 - 8x + 12$
$= (5 - 8)x - 15y + (-12 + 12)$
$= -3x - 15y$

18. $3[x - y(3x + y) + y^2] = 3[x - 3xy - y^2 + y^2]$
$ = 3[x - 3xy]$
$ = 3x - 9xy$

20. $7b(3b^2 - 2b - 5) - 2b(4 - b)$
$= 21b^3 - 14b^2 - 35b - 85 + 2b^2$
$= 21b^3 - 12b^2 - 43b$

22. $2b^2 - 3[5b + 2b(2 - b)] = 2b^2 - 3[5b + 4b - 2b^2]$
$= 2b^2 - 3[9b - 2b^2]$
$= 2b^2 - 27b + 6b^2$
$= 8b^2 - 27b$

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

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

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

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. $P = I \times E = 12$ A $\times 1.8$ V $= 21.6$ W
The power loss is 21.6 W per conductor. Since there are two conductors, the total power loss is 2×21.6 W $= 43.2$ W.

2. $E = 3\% \times 240$ V $= 0.03 \times 240$ V $= 7.2$ V
$P = I \times E = 24$ A $\times 7.2$ V $= 172.8$ W
The power loss is 172.8 W.

3. $I = \dfrac{E}{R} = \dfrac{120 \text{ V}}{200 \text{ ohms}} = 0.6$ A
The amount of current flow is 0.6 A.

4. $V = L \times W \times H = 4$ in. $\times 4$ in. $\times 1\frac{1}{2}$ in. $= 24$ in.^{3}
The volume of one box is 24 in.^{3}.
volume of one box $\times 7$ boxes $= 24$ in.$^3 \times 7$
$= 168$ 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. $\left|-\dfrac{1}{4}\right| = \dfrac{1}{4}$

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. $\left(\dfrac{1}{2}\right)^4 = \left(\dfrac{1}{2}\right)\left(\dfrac{1}{2}\right)\left(\dfrac{1}{2}\right)\left(\dfrac{1}{2}\right) = \dfrac{1}{16}$

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
$6x^2 - xy + 3y^2 = 6(4)^2 - (4)(-1) + 3(-1)^2$
$\qquad\qquad\qquad = 6(16) - (4)(-1) + 3(1)$
$\qquad\qquad\qquad = 96 - (-4) + 3$
$\qquad\qquad\qquad = 96 + 4 + 3$
$\qquad\qquad\qquad = 103$

13. $A = \dfrac{1}{2}a(b_1 + b_2)$
$\quad = \dfrac{1}{2}(50)(40 + 60)$
$\quad = 25(100)$
$\quad = 2500$
The area is 2500 square feet.

14. $4\{9x - [2(x + 3) - 8]\} = 4\{9x - [2x + 6 - 8]\}$
$\qquad\qquad\qquad\qquad = 4\{9x - [2x - 2]\}$
$\qquad\qquad\qquad\qquad = 4\{9x - 2x + 2\}$
$\qquad\qquad\qquad\qquad = 4\{7x + 2\}$
$\qquad\qquad\qquad\qquad = 28x + 8$

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. $\dfrac{1}{2} + \left(-\dfrac{5}{6}\right) = \dfrac{3}{6} + \left(-\dfrac{5}{6}\right) = -\dfrac{2}{6} = -\dfrac{1}{3}$

6. $-\dfrac{3}{11} + \left(-\dfrac{1}{22}\right) = -\dfrac{6}{22} + \left(-\dfrac{1}{22}\right) = -\dfrac{7}{22}$

7. $\dfrac{3}{4} + \left(-\dfrac{1}{12}\right) + \left(-\dfrac{1}{2}\right) = \dfrac{9}{12} + \left(-\dfrac{1}{12}\right) + \left(-\dfrac{6}{12}\right)$
$\qquad\qquad\qquad\qquad\qquad = \dfrac{2}{12}$
$\qquad\qquad\qquad\qquad\qquad = \dfrac{1}{6}$

8. $\dfrac{2}{15} + \dfrac{1}{6} + \left(-\dfrac{4}{5}\right) = \dfrac{4}{30} + \dfrac{5}{30} + \left(-\dfrac{24}{30}\right)$

$\qquad\qquad\qquad\quad = -\dfrac{15}{30}$

$\qquad\qquad\qquad\quad = -\dfrac{1}{2}$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$\qquad\qquad\qquad\qquad = -20 + (-24)$

$\qquad\qquad\qquad\qquad = -44$

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

$\qquad\qquad\qquad\qquad\quad = 20 + 0.1 \times 0.04$

$\qquad\qquad\qquad\qquad\quad = 20 + 0.004$

$\qquad\qquad\qquad\qquad\quad = 20.004$

35. $(3-6)^2 + (-12) \div (-3)(-2)$

$\quad = (-3)^2 + (-12) \div (-3)(-2)$

$\quad = 9 + (-12) \div (-3)(-2)$

$\quad = 9 + 4(-2)$

$\quad = 9 - 8$

$\quad = 1$

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

37. $3x(6 - x + 3y) = 3x(6) + 3x(-x) + 3x(3y)$

$\qquad\qquad\qquad = 18x - 3x^2 + 9xy$

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

$\quad = -1(7x^2) + (-1)(-3x) + (-1)(11)$

$\quad = -7x^2 + 3x - 11$

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

$\quad = (2xy)(-3y^2) + x(-3y^2) - y(-3y^2)$

$\quad = -6xy^3 - 3xy^2 + 3y^3$

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

$\quad = (3-8)a^2b + (-2+5)bc + (6-6)bc^2$

$\quad = -5a^2b + 3bc$

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

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

43. $-x + \dfrac{1}{2} + 14x^2 - 7x - 1 - 4x^2$
$= (14 - 4)x^2 + (-7 - 1)x + \dfrac{1}{2} - 1$
$= 10x^2 - 8x - \dfrac{1}{2}$

44. If $x = -7$, then
$7x - 6 = 7(-7) - 6 = -49 - 6 = -55.$

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

46. If $x = -3$, then
$x^2 + 3x - 4 = (-3)^2 + 3(-3) - 4$
$= 9 - 9 - 4$
$= -4.$

47. If $x = 3$, then
$-x^2 + 5x - 9 = -3^2 + 5(3) - 9 = -9 + 15 - 9 = -3.$

48. If $x = -1$, then
$2x^3 - x^2 + 6x + 9 = 2(-1)^3 - (-1)^2 + 6(-1) + 9$
$= -2 - 1 - 6 + 9$
$= 0.$

49. If $a = -1$, $b = 5$, and $c = -2$, then
$b^2 - 4ac = (5)^2 - 4(-1)(-2) = 25 - 8 = 17.$

50. If $m = -4$, $M = 15$, $G = -1$, and $r = -2$, then
$\dfrac{mMG}{r^2} = \dfrac{-4(15)(-1)}{(-2)^2} = \dfrac{60}{4} = 15.$

51. If $p = 6000$, $r = 18\%$, and $t = \dfrac{3}{4}$, then
$I = prt = 6000(0.18)\left(\dfrac{3}{4}\right) = 810.$
The interest is $810.

52. $F = \dfrac{9C + 160}{5}$
$= \dfrac{9(20) + 160}{5}$
$= \dfrac{180 + 160}{5}$
$= \dfrac{340}{5}$
$= 68$

$F = \dfrac{9C + 160}{5}$
$= \dfrac{9(25) + 160}{5}$
$= \dfrac{225 + 160}{5}$
$= \dfrac{385}{5}$
$= 77$
The range is 68°F to 77°F.

53. If $r = 4$, $A = \pi r^2$
$\approx 3.14(4)^2$
$\approx 3.14(16)$
≈ 50.24 square feet.
Cost = (50.24 sq ft)($1.50/sq ft) = $75.36
The total cost is $75.36.

54. $P = 180S - R - C$
$= 180(56) - 300 - 1200$
$= 10{,}080 - 300 - 1200$
$= 8580$
The daily profit is $8580.

55. $A = \dfrac{1}{2}a(b_1 + b_2)$, $a = 200$, $b_1 = 700$, $b_2 = 300$
$A = \dfrac{1}{2}(200)(700 + 300)$
$= 100(1000)$
$= 100{,}000$
Cost = 2(100,000) = 200,000
The area is $100{,}000$ ft^2 and the cost is $200,000.

56. $A = \dfrac{1}{2}ab$, $a = 3.8$, $b = 5.5$
$A = \dfrac{1}{2}(3.8)(5.5) = 10.45$
Cost = 66(10.45) = 689.70
The area is 10.45 ft^2 and the cost is $689.70.

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

58. $3(x - 2) - 4(5x + 3) = 3x - 6 - 20x - 12$
$= -17x - 18$

59. $2[3 - (4 - 5x)] = 2(3 - 4 + 5x)$
$= 2(-1 + 5x)$
$= -2 + 10x$

60. $-3x[x + 3(x - 7)] = -3x(x + 3x - 21)$
$= -3x(4x - 21)$
$= -12x^2 + 63x$

61. $2xy^3 - 6x^3y - 4x^2y^2 + 3(xy^3 - 2x^2y - 3x^2y^2)$
$= 2xy^3 - 6x^3y - 4x^2y^2 + 3xy^3 - 6x^2y - 9x^2y^2$
$= (2 + 3)xy^3 - 6x^3y + (-4 - 9)x^2y^2 - 6x^2y$
$= 5xy^3 - 6x^3y - 13x^2y^2 - 6x^2y$

62. $-5(x + 2y - 7) + 3x(2 - 5y)$
$= -5x - 10y + 35 + 6x - 15xy$
$= x - 10y + 35 - 15xy$

63. $-(a + 3b) + 5[2a - b - 2(4a - b)]$
$= -(a + 3b) + 5(2a - b - 8a + 2b)$
$= -(a + 3b) + 5(-6a + b)$
$= -a - 3b - 30a + 5b$
$= -31a + 2b$

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

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

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

67. $-6.3 + 4 = -2.3$

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

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

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

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

72. $-1.1 - (-0.2) + 0.4 = -1.1 + 0.2 + 0.4$
$= -0.9 + 0.4$
$= -0.5$

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

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

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

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

77. $400 + 1000 - 800 = 1400 - 800 = 600$
Her score was $600.

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

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

80. $9(5) - 5(2)^3 + 5 = 9(5) - 5(8) + 5$
$= 45 - 5(8) + 5$
$= 45 - 40 + 5$
$= 5 + 5$
$= 10$

81. $3.8x - 0.2y - 8.7x + 4.3y$
$= (3.8 - 8.7)x + (-0.2 + 4.3)y$
$= -4.9x + 4.1y$

82. If $p = -2$ and $q = 3$, then
$\dfrac{2p + q}{3q} = \dfrac{2(-2) + 3}{3(3)} = \dfrac{-4 + 3}{9} = -\dfrac{1}{9}$.

83. If $s = -3$ and $t = -2$, then
$\dfrac{4s - 7t}{s} = \dfrac{4(-3) - 7(-2)}{-3} = \dfrac{-12 + 14}{-3} = -\dfrac{2}{3}$.

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

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

$F = 69.48 + 32$

$F = 101.48°$

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

85. $-7(x - 3y^2 + 4) + 3y(4 - 6y)$

$= -7x + 21y^2 - 28 + 12y - 18y^2$

$= -7x + 3y^2 + 12y - 28$

86. $-2\{6x - 3[7y - 2y(3 - x)]\}$

$= -2\{6x - 3[7y - 6y + 2xy]\}$

$= -2\{6x - 3[y + 2xy]\}$

$= -2\{6x - 3y - 6xy\}$

$= -12x + 6y + 12xy$

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

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

10. $(0.2)^2 - (2.1)(-3) + 0.46$

$= 0.04 - (2.1)(-3) + 0.46$

$= 0.04 - (-6.3) + 0.46$

$= 0.04 + 6.3 + 0.46$

$= 6.34 + 0.46$

$= 6.8$

11. $3(4 - 6)^3 + 12 \div (-4) + 2$

$= 3(-2)^3 + 12 \div (-4) + 2$

$= 3(-8) + 12 \div (-4) + 2$

$= -24 + (-3) + 2$

$= -25$

12. $-5x(x + 2y - 7) = -5x(x) - 5x(2y) - 5x(-7)$

$= -5x^2 - 10xy + 35x$

13. $-2ab^2(-3a - 2b + 7ab)$

$= -2ab^2(-3a) - 2ab^2(-2b) - 2ab^2(7ab)$

$= 6a^2b^2 + 4ab^3 - 14a^2b^3$

14. $6ab - \dfrac{1}{2}a^2b + \dfrac{3}{2}ab + \dfrac{5}{2}a^2b$

$= \left(6 + \dfrac{3}{2}\right)ab + \left(-\dfrac{1}{2} + \dfrac{5}{2}\right)a^2b$

$= \left(\dfrac{12}{2} + \dfrac{3}{2}\right)ab + \dfrac{4}{2}a^2b$

$= \dfrac{15}{2}ab + 2a^2b$

15. $2.3x^2y - 8.1xy^2 + 3.4xy^2 - 4.1x^2y$

$= (2.3 - 4.1)x^2y + (-8.1 + 3.4)xy^2$

$= -1.8x^2y - 4.7xy^2$

16. $3(2 - a) - 4(-6 - 2a) = 6 - 3a + 24 + 8a$

$= 5a + 30$

17. $5(3x - 2y) - (x + 6y) = 15x - 10y - x - 6y$

$= (15 - 1)x + (-10 - 6)y$

$= 14x - 16y$

18. If $x = 3$ and $y = -4$, then

$x^3 - 3x^2y + 2y - 5 = 3^3 - 3(3)^2(-4) + 2(-4) - 5$

$= 27 - 3(9)(-4) - 8 - 5$

$= 27 + 108 - 8 - 5$

$= 122.$

19. If $x = -3$, then

$3x^2 - 7x - 11 = 3(-3)^2 - 7(-3) - 11$

$= 3(9) - 7(-3) - 11$

$= 27 + 21 - 11$

$= 37.$

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

$$2a - 3b = 2\left(\frac{1}{3}\right) - 3\left(-\frac{1}{2}\right)$$
$$= \frac{2}{3} + \frac{3}{2}$$
$$= \frac{4}{6} + \frac{9}{6}$$
$$= \frac{13}{6} \text{ or } 2\frac{1}{6}.$$

21. $k = 1.61r = 1.61(60) = 96.6$
You are traveling at 96.6 kilometers per hour.

22. $A = \frac{1}{2}a(b_1 + b_2)$, $a = 120$, $b_1 = 200$, $b_2 = 180$

$$A = \frac{1}{2}(120)(200 + 180)$$
$$= 60(380)$$
$$= 22,800$$
The area is 22,800 square feet.

23. $A = \frac{1}{2}ab$, $a = 6.8$, $b = 8.5$

$$A = \frac{1}{2}(6.8)(8.5) = 28.9$$
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.

25. $3[x - 2y(x + 2y) - 3y^2] = 3[x - 2xy - 4y^2 - 3y^2]$
$$= 3[x - 2xy - 7y^2]$$
$$= 3x - 6xy - 21y^2$$

26. $-3\{a + b[3a - b(1 - a)]\} = -3[a + b(3a - b + ab)]$
$$= -3(a + 3ab - b^2 + ab^2)$$
$$= -3a - 9ab + 3b^2 - 3ab^2$$