Chapter 7 BASIC ALGEBRA

Write an algebraic expression for each of the following.

1. Seven times x plus 3 times y.
2. Four times the square of h minus twice the cube of k.
3. Three x cubed plus two y squared.
4. Five times a plus b multiplied by the square root of c.
5. Twice x^2 minus 4 times the cube root of y.
6. The cost of x articles at two dollars each.
7. The cost of y apples which are sold at 3 for a dollar.
8. The total distance moved by a body in x hours at a speed of k km per hour.
9. Nine times the product of x and $3h$ minus the quotient when k is divided by $2y$.
10. The cube of the sum of x and y minus the square root of the sum of $5x$ and $3y$.

If $a = 3$, $b = 2$ and $c = -1$, find the value of each of the following.

11. $a^3 + b^3 + c^3 - 2abc$
12. $(2a + b - c)(4b - 3c)$
13. $(a - b)^2 - (b - c)^2$
14. $\frac{a}{b} + \frac{b}{c} - \frac{c}{a}$
15. $\frac{a+1}{2} - \frac{b+c}{4} + \frac{c-a}{3}$
16. $a^b - c^a + b^a$
17. $2a - 3b^2 + 3abc^2$
18. $a^2 + 3b^3 - 4c^5$
19. $\frac{a+b}{c} - \frac{ab-c}{b}$
20. $\frac{3a-b}{b-c} + \frac{a+c}{b-a}$
21. $\frac{2c^2-3a}{bc-a} - \frac{4b}{3a}$
22. $\frac{a^2-b^2}{c^2} - \frac{a^3-c}{(c-3b)}$

23. Find the value of $x^3 + 2xy^2 + y^3$ when $x = 2$ and $y = -1$.

24. Find the value of $\frac{x+1}{x-1} + \frac{2x-1}{2x+1}$ when $x = -2$.

25. Find the value of $2ab + 3bc^2$ when $a = 0$, $b = 5$ and $c = -2$.

26. If $x = 2$ and $y = -3$, evaluate each of the following.
    (i) $x^2 + 3xy - y^2$ (ii) $x^3 - y^3$ (iii) $\frac{x}{y} - \frac{y}{x}$ (iv) y^x

27. Find the value of $x^3 + 2x^2 - 3(x + 2)$ when $x = -2$.

28. Find the value of $(2x - 1)(2x + 1)(2x + 3)$ when $x = -3$.

Simplify the following expressions.

29. $5a + 3a - 6a$
30. $7a - 5a + a$
31. $3a - (5a - 4a)$
32. $3a + 4b - a - b$
33. $2x - 3y + 7x - 4y - x$
34. $12a + 5b - 7a - 14b - 9a$
35. $5x + 7y + 3z - 2x - 4y + z$
36. $3a - 2b + 6c - 5a - 7b - c$
37. $2p - 5q + 7r - 4p + 2q - 3r$
38. $12xy - 13xz + 5yz - 4xz$
39. $7abc - 4bca + 6cba - cba$
40. $3a^2 - 4a + 5a^2 - 7a + 4$
41. $2x^3 - 5x^2 + 7x^3 - 4x^2 + 5x$
42. $3x^2 - 7x + 4x^3 - 5x + 6x^2$
43. $5ab - 1\frac{1}{2}ab + \frac{3}{4}bc + \frac{1}{4}cb$
44. $\frac{1}{2}x + \frac{1}{3}y - \frac{1}{4}x + \frac{2}{3}z + y$

Simplify each of the following.

45. $3(x - 2y) - 2(3x - y) + 6(x - y)$
46. $(x + y) - 2(5x - y) - 4(3x - 2y)$
47. $2(3x + y) - 5[3(x - 3y) - 4(2x - y)]$
48. $7[(x - y) - 2(x + 3y)] - 4(x - 13y)$
49. $2x - 3\{2(5x - y) - 4[x - (7x - y)]\}$
50. $[2(x + 5y) - 3(x - y)] - 7[3x - (x + 6y)]$

51. $3px + qy - rz - (px - qy + rz)$

52. $5p + 3q - 4r - (6q - 3p + r)$

53. $5a + 4b - 3c + \left(3\frac{1}{2}a + 2\frac{1}{2}b - 3\frac{1}{2}c\right) - \left(2a - 1\frac{1}{2}b + 1\frac{1}{2}c\right)$

54. $a(5a^2 - 4a - 3) - a^2(4a - 1) + a(1 - 2a^2)$

Simplify each of the following.

55. $\dfrac{4}{3a^2b} \div \dfrac{2}{9ab^2}$

56. $2t \times 6t^2$

57. $\dfrac{5}{6}x^2 \div \dfrac{3}{4}x$

58. $14x^6 \div 2x^3$

59. $\dfrac{10x - y}{2z} - \dfrac{x + y}{4z}$

60. $\dfrac{2xy}{3z} \times \dfrac{5xz}{4y} \div \dfrac{15x^2y}{8yz}$

61. $\sqrt{\dfrac{9x^2}{36y^4}} \div \dfrac{2y}{9x^2}$

62. $\dfrac{\sqrt{9x^2y^4}}{2} \div \dfrac{4x}{7y}$

63. $\left(\dfrac{3xy}{z}\right)^2 \div \dfrac{2x^3y}{5z} \times \left(\dfrac{4x}{15y}\right)^2$

64. $\sqrt{\dfrac{121x^4}{49y^6}} \times \dfrac{3xy^2}{4z} \div \left(\dfrac{x}{y}\right)^2$

Simplify the following algebraic fractions.

65. $\dfrac{x}{2} + \dfrac{x - 3}{3} - \dfrac{x - 4}{4}$

66. $\dfrac{2x - y}{2} + \dfrac{x - y}{3}$

67. $\dfrac{4x - y}{2} + \dfrac{x - y}{4} - \dfrac{2x + 3y}{3}$

68. $\dfrac{x + y}{2} - \dfrac{x + 5y}{4} + \dfrac{5x - 4y}{8}$

69. $\dfrac{2x - 3y}{5} - \dfrac{x - 6y}{10} + \dfrac{5x + 6y}{15}$

70. $\dfrac{5x - y}{4} - \dfrac{x - y}{6} + \dfrac{3x + 5y}{8}$

71. $\dfrac{5x - 6y}{7} + \dfrac{3x - 4y}{14} - \dfrac{7x + 9y}{21}$

72. $\dfrac{5x + 7y}{6} - \dfrac{x - y}{9} - \dfrac{2x - 3y}{12}$

73. $\dfrac{2x + 3y}{a} + \dfrac{5x + 2y}{2a}$

74. $\dfrac{5x - 9y}{2a} - \dfrac{4x - 7y}{4a} + \dfrac{6x - 5y}{6a}$

Find the sum of the following expressions.

75. $a + b + c,\ 2b - c,\ 3c + a$

76. $x + y,\ y - z,\ z - x$

77. $a^2 + b^2 - c^2,\ 2c^2 - b^2 + a^2,\ 5a^2 + 7c^2$

78. $2h^2 + 4k^2,\ -5h^2 - 7k^2,\ h^2 - k^2$

79. $2ab + 3bc,\ 5ac - 5ba,\ 2cb + 5ab$

80. $2a^3 + 3b^2 - c,\ 5b^3 + 2a^2 + 5c,\ a^3 - b^2$

81. $5abc - 7cb + 4ac,\ 4cba - 4bc + 3ca$

82. $9ab^2 - 7ab,\ 6bc + 5a^2b - 2ab^2,\ 4ab$

83. $\dfrac{1}{2}xy,\ \dfrac{1}{3}xy^2 - \dfrac{1}{4}yx,\ \dfrac{1}{6}xy^2 + xy$

84. $\dfrac{3}{4}xyz - \dfrac{1}{2}xz,\ \dfrac{2}{3}yz - \dfrac{1}{4}xyz - xz$

85. $x^2yz + xy^2z - xyz^2,\ \dfrac{1}{2}x^2yz - xy^2z$

86. $8x^3 + 7x^2,\ 4x^2 + 3x - 1,\ 8x^2 + 9x^3 - 4$

Subtract

87. $2x^3 + 5x^2 - 4x + 3$ from $7x^2 + 5x^3 - 4x - 5$.

88. $5x^3 + 4x^2 - 3x - 2$ from $14 + 2x - 12x^2 + 7x^3$.

89. $4x^2 + 7x^3 - 5x$ from $3x(2x^3 - 2x^2 + 7)$.

90. $x^3 - 6x - 4$ from $5x^3 - 5x^2 + 14$.

91. $12x^3 + 5x - 9$ from $2x(3x^2 - 5)$.

92. $x[5x - 3(x - 1)]$ from $4x - 4[2(x - 3) - x(2x - 5)]$.

93. $2a(3a^2 - 5a) + 5$ from $6a(2 - 3a + 5a^2) - 4(a^2 + 5)$.

94. $5x(2x - 4y) - 3(x - 7y)$ from $7(3x^2 + y) - 4x(3y - 5x)$.

95. Subtract $2x^2 + 3x^3 - 5$ from the sum of $(2x^3 - 5x + 7)$ and $(2x - 5x^3 + 4)$.

96. Subtract the sum of $(5x^2 - 7x + 4)$ and $(2x - 5x^3 + 1)$ from $2x(3x^2 - 1 + 5x)$.

97. Subtract the sum of $(2x^2 - 7x + 4)$ and $(5x - 4x^3 + 7)$ from the sum of $(3x^2 - 8x + 9)$ and $(15 - 4x - 3x^3)$.

Term I Test B

1. (i) 130 (ii) 440 (iii) 19 100 (iv) 32·4 (v) 0·424 3

2. (i) $40\frac{5}{6}$ (ii) 1 (iii) 6 (iv) 4

3. (i) 2·412 (ii) 13·9 (iii) 1

4. (a) (i) 462 (ii) 117
(b) 3, 216

5. (i) 400 (ii) 80 (iii) 5

6. (i) $-\frac{1}{2}$ (ii) −1 (iii) 4 (iv) $\frac{57}{68}$

7. (i) 3 (ii) 3 (iii) $\frac{1}{40}$

8. (a) 3 000
(b) (i) 59·96 (ii) 30·231
(c) (i) $1\cdot\dot{9}\dot{0}$ (ii) 1·91
(d) $\frac{21}{40}$

9. (a) (i) 50 (ii) 100
(b) 1026

10. (i) (a) 11, 13 (b) 24, 28
(c) 84, 112 (d) 85, 113
(ii) $13^2 + 84^2 = 85^2$,
$15^2 + 112^2 = 113^2$

Term I Test C

1. (i) 77 (ii) −130 (iii) −15 (iv) −86 (v) 1

2. (i) 1·125 (ii) 3·972 5
(iii) 4 (iv) 3

3. (i) $5\frac{1}{2}$ (ii) $\frac{1}{2}$
(iii) $1\frac{1}{22}$ (iv) $\frac{2}{15}$

4. (a) 0·687 5 (b) $1\frac{19}{40}$
(c) (i) 40·061 (ii) 40·06

5. (a) (i) 315 (ii) 1 080
(iii) 1 320
(b) (i) 42 (ii) 126

6. (a) (i) $\frac{33}{100}, 0\cdot333, 0\cdot\dot{3}, 1\cdot73, 1\frac{3}{4}$
(ii) $\frac{83}{220}, \frac{17}{44}, \frac{64}{165}, \frac{103}{264}$
(b) $7 752

7. (i) 300 (ii) 20 (iii) 90

8. $2 000

9. (i) 593·29 (ii) 7·08
(iii) 684·83

10. (a) $32 \times 57 = 1\,824$,
$64 \times 57 = 3\,648$
(b) (i) 1 197 (ii) 1 539
(iii) 2 223

Chapter 7

1. $7x + 3y$ **2.** $4h^2 - 2k^3$
3. $3x^3 + 2y^2$ **4.** $5a + b\sqrt{c}$
5. $2x^2 - 4\sqrt[3]{y}$ **6.** $2x
7. $\frac{1}{3}$y or $\frac{y}{3}$ **8.** xk km
9. $27xh - \frac{k}{2y}$ **10.** $(x+y)^3 - \sqrt{15xy}$
11. 46 **12.** 99 **13.** −8
14. $-\frac{1}{6}$ **15.** $\frac{5}{12}$ **16.** 18
17. 12 **18.** 37 **19.** $-8\frac{1}{2}$
20. $\frac{1}{3}$ **21.** $\frac{23}{45}$ **22.** 9
23. 11 **24.** 2 **25.** 60
26. (i) −23 (ii) 35 (iii) $\frac{5}{6}$ (iv) 9
27. 0 **28.** −105 **29.** $2a$
30. $3a$ **31.** $2a$ **32.** $2a + 3b$
33. $8x - 7y$ **34.** $-4a - 9b$
35. $3x + 3y + 4z$ **36.** $-2a - 9b + 5c$
37. $-2p - 3q + 4r$
38. $12xy - 17xz + 5yz$
39. $8abc$
40. $8a^2 - 11a + 4$
41. $9x^3 - 9x^2 + 5x$
42. $4x^3 + 9x^2 - 12x$
43. $3\frac{1}{2}ab + bc$
44. $\frac{1}{4}x + 1\frac{1}{3}y + \frac{2}{3}z$
45. $3x - 10y$ **46.** $11y - 21x$
47. $31x + 27y$ **48.** $3y - 11x$
49. $-100x + 18y$ **50.** $-15x + 55y$
51. $2px + 2qy - 2rz$
52. $8p - 3q - 5r$
53. $6\frac{1}{2}a + 8b - 8c$
54. $-a^3 - 3a^2 - 2a$
55. $\frac{6b}{a}$ **56.** $12t^3$
57. $\frac{10x}{9}$ **58.** $7x^3$
59. $\frac{19x - 3y}{4z}$ **60.** $\frac{4z}{9}$
61. $\frac{9x^3}{4y^3}$ **62.** $\frac{21y^3}{8}$
63. $\frac{8x}{5yz}$ **64.** $\frac{33xy}{28z}$
65. $\frac{7x}{12}$ **66.** $\frac{8x - 5y}{6}$
67. $\frac{19x - 21y}{12}$ **68.** $\frac{7x - 10y}{8}$
69. $\frac{19x + 12y}{30}$ **70.** $\frac{35x + 13y}{24}$
71. $\frac{25x - 66y}{42}$ **72.** $\frac{20x + 55y}{36}$
73. $\frac{9x + 8y}{2a}$ **74.** $\frac{30x - 43y}{12a}$
75. $2a + 3b + 3c$ **76.** $2y$
77. $7a^2 + 8c^2$ **78.** $-2h^2 - 4k^2$
79. $2ab + 5bc + 5ac$
80. $3a^3 + 5b^3 + 2a^2 + 2b^2 + 4c$
81. $9abc - 11bc + 7ac$
82. $7ab^2 + 5a^2b - 3ab + 6bc$
83. $\frac{1}{2}xy^2 + 1\frac{1}{4}xy$
84. $\frac{1}{2}xyz - 1\frac{1}{2}xz + \frac{2}{3}yz$
85. $1\frac{1}{2}x^2yz - xyz^2$
86. $17x^3 + 19x^2 + 3x - 5$
87. $3x^3 + 2x^2 - 8$
88. $2x^3 - 16x^2 + 5x + 16$
89. $6x^4 - 13x^3 - 4x^2 + 26x$
90. $4x^3 - 5x^2 + 6x + 18$
91. $-6x^3 - 15x + 9$
92. $6x^2 - 27x + 24$
93. $24a^3 - 12a^2 + 12a - 25$
94. $31x^2 + 8xy + 3x - 14y$
95. $-6x^3 - 2x^2 - 3x + 16$
96. $11x^3 + 5x^2 + 3x - 5$
97. $x^3 + x^2 - 10x + 13$

Chapter 8

1. 5 **2.** 4 **3.** 1 **4.** −3
5. 3 **6.** $-6\frac{2}{3}$ **7.** $-3\frac{3}{4}$
8. $-1\frac{1}{2}$ **9.** $1\frac{1}{2}$ **10.** $2\frac{10}{11}$
11. 3 **12.** $-2\frac{1}{6}$ **13.** 20
14. 12·5 **15.** 8 **16.** 30
17. 1·05 **18.** 8·5 **19.** 13
20. −8 **21.** 0·8 **22.** 13
23. $6\frac{1}{3}$ **24.** $4\frac{1}{3}$ **25.** 2
26. $-\frac{1}{2}$ **27.** $-7\frac{1}{5}$ **28.** −33
29. $-\frac{1}{4}$ **30.** 8 **31.** $-2\frac{2}{7}$
32. $3\frac{3}{4}$ **33.** 4 **34.** $-1\frac{1}{2}$
35. $1\frac{10}{11}$ **36.** $\frac{8}{17}$ **37.** $\frac{23}{212}$
38. 8 **39.** −2 **40.** −3
41. 5 **42.** −13 **43.** $4\frac{1}{2}$