Answers for 5.3

For use with pages 349–352

5.3 Skill Practice

1. like terms

2. *Sample answer:* To subtract a polynomial, add the opposite of each like term that is being subtracted.

3. $10x^2 - 8$ **4.** $5x^2 - 11x - 4$

5. $14y - 8$ **6.** $6z^2 - 6z - 13$

7. $7s^3 - 2s^2 + 8s + 10$

8. $-a^3 - 2a^2 + 12a - 12$

9. $2c^3 + 5c^2 + c + 9$

10. $4t^3 - 4t^2 + 9t - 8$

11. $-2b^4 - 15b^3 + 5b + 7$

12. $-y^4 - 6y^3 + 3y^2 - 2y + 5$

13. $2x^4 - x^3$

14. $8v^4 - 3v^3 + 10v^2 - 7v - 4$

15. B

16. $2x^3 - 5x^2 + 7x$

17. $30x^3 + 10x^2$

18. $y^2 - y - 42$

19. $3z^2 - 8z - 3$

20. $w^3 + 10w^2 + 13w - 44$

21. $2a^3 - 23a^2 + 26a + 6$

22. $10c^4 + 5c^3 - 23c^2 - 4c + 12$

23. $-x^4 + 12x^3 - 34x^2 + 4x + 3$

24. $-3d^4 + 19d^3 - 25d^2 + 3d + 18$

25. $12y^4 - 9y^3 - 85y^2 - 19y + 5$

26. When subtracting polynomials, write the opposite of the subtracted polynomial, then add like terms; $(x^2 - 3x + 4) - (x^3 + 7x - 2) = x^2 - 3x + 4 - x^3 - 7x + 2 = -x^3 + x^2 - 10x + 6$.

27. The cube of a binomial $(a - b)^3$ is found by $a^3 - 3a^2b + 3ab^2 - b^3$; $(2x - 7)^3 = (2x)^3 - 3(2x)^2(7) + 3(2x)(7)^2 - (7)^3$, $= 8x^3 - 84x^2 + 294x + 343$.

28. $x^3 - 7x^2 - 14x + 120$

29. $x^3 - 3x^2 - 25x - 21$

30. $-z^3 - 2z^2 + 40z - 64$

31. $2a^3 - 5a^2 - 37a - 30$

32. $3p^3 + 13p^2 + 13p + 3$

33. $-2b^3 + 7b^2 - 7b + 2$

34. $24s^3 - 22s^2 - 5s + 6$

35. $-12w^3 + 95w^2 - 143w + 30$

36. $40x^3 + 162x^2 + 69x - 28$

37. $-27q^3 + 132q^2 - 172q + 32$

38. $x^2 - 25$

39. $w^2 - 18w + 81$

40. $y^3 + 12y^2 + 48y + 64$

41. $4c^2 + 20c + 25$

42. $27x^3 - 108x^2 + 144x - 64$

43. $25p^2 - 9$

44. $343x^3 - 147x^2y + 21xy^2 - y^3$

45. $4a^2 - 81b^2$

46. $343y^3 + 441y^2z + 189yz^2 + 27z^3$

47. D

48. $3x^3 + 10x^2 + 3x$

49. $2\pi x^3 - 13\pi x^2 + 8\pi x + 48\pi$

50. $x^3 - 15x^2 + 75x - 125$

51. $4x^3 - \frac{20}{3}x^2 - 7x + 12$

52. $(a + b)(a - b)$
$= a^2 - ab + ab - b^2 = a^2 - b^2$

53. $(a + b)^2$
$= (a + b)(a + b)$
$= a^2 + ab + ab + b^2$
$= a^2 + 2ab + b^2$

54. $(a + b)^3 = (a + b)(a + b)(a + b)$
$= (a + b)(a^2 + 2ab + b^2) =$
$a^3 + 2a^2b + ab^2 + a^2b +$
$2ab^2 + b^3 = a^3 + 3a^2b +$
$3ab^2 + b^3$

55. $(a - b)^3 = (a - b)(a - b)(a - b)$
$= (a - b)(a^2 - 2ab + b^2) =$
$a^3 - 2a^2b + ab^2 - a^2b +$
$2ab^2 - b^3 = a^3 - 3a^2b +$
$3ab^2 - b^3$

56. **a.** 4 **b.** 4

c. 6 **d.** m, m, $m + n$

57. **a.** $(x - 1)(x^4 + x^3 + x^2 + x + 1)$;
$(x - 1) \cdot$
$(x^5 + x^4 + x^3 + x^2 + x + 1)$

b. $(x - 1) \cdot$
$(x^{n-1} + x^{n-2} + x^{n-3} + \cdots + 1)$

58. $(x + a)(x + b)(x + c)(x + d)$
$= (x^2 + ax + bx + ab) \cdot$
$(x^2 + cx + dx + cd) =$
$x^4 + cx^3 + dx^3 + cdx^2 + ax^3 +$
$acx^2 + adx^2 + acdx + bx^3 +$
$bcx^2 + bdx^2 + bcdx + abx^2 +$
$abcx + abdx + abcd =$
$x^4 + (a + b + c + d)x^3 +$
$(cd + ac + ad + bc + bd + ab) \cdot$
$x^2 + (acd + bcd + abc + abd) \cdot$
$x + abcd$, so the coefficient of x^3 is the sum of a, b, c, and d and the constant term is the product of a, b, c, and d.

5.3 Problem Solving

59. $0.281t^3 - 16.8t^2 + 460t + 8600$

60. $28.0302t^3 - 223.3062t^2 + 815.202t + 1176.6$; about \$2369.3 million

61. $F = 0.000031s^3 + 0.002107s$; about 0.05 horsepower

62. $M(r) = \frac{2}{3}\pi r^3 + \frac{1}{2}\pi r^2 + \pi r + \frac{1}{2}\pi$, $D(r) = \frac{2}{3}\pi r^3 + \frac{5}{2}\pi r^2 + 3\pi r + \frac{7}{6}\pi$, $C(r) = 2\pi r^2 + 2\pi r + \frac{2}{3}\pi$

63. $N = -1.51503t^4 - 25.53106t^3 + 215.9226t^2 + 127.75t + 9858.5$; calculate $L_m \cdot S_m + L_w \cdot S_w$.

64. $C = -0.00105s^3 + 0.01235s^2 + 0.66725s + 51.69625$

5.3 Mixed Review

65. 9

66. -5

67. 3.5

68. 8, -6

69. 6, 9

70. -7, -2

71. -6, 0.75

72. $1\frac{2}{3}$

73. $(5, -5, 2)$

74. $(0, 8, 3)$

75. $(9, -1, 4)$

76. 15

77. 73

78. 86

79. -111