Margin Exercise Answers

1. a. $7a(x-7)(x+7)$ **b.** $(y^3+10)(y^3-10)$ **2. a.** Not factorable **b.** $5(9x^2+4)$

3. a. $(z+20)^2$ **b.** $(y-7)^2$ **c.** $3z(x-3y)^2$ **d.** $(y+4-z)(y+4+z)$

4. a. $(y-3)(y^2+3y+9)$ **b.** $(2y-x^2)(4y^2+2x^2y+x^4)$ **c.** $6(2x^4-5)(4x^8+10x^4+25)$

5.3 Exercises

Concept Check

Fill-in-the-Blank. Complete the sentences using information found in this section.

1. Factoring a perfect square trinomial gives a square _____.
2. In a perfect square trinomial, both the first and last terms must be perfect _____.
3. If the first term of a perfect square trinomial is x^2, and the last term is of the form a^2, then the middle term must be of the form _____ or _____.
4. The formula for factoring the difference of cubes is $x^3 - a^3 =$ _____.
5. The formula for factoring the sum of two cubes is $x^3 + a^3 =$ _____.
6. The first 6 perfect cubes are 1, 8, ___, ___, ___, and ___.

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

7. The expression $x^2 + 20x + 100$ is a perfect square trinomial.
8. When factoring polynomials, always look for a common monomial factor first.
9. The sum of two squares, $(x^2 + a^2)$, is factorable.
10. Sixty-four is a perfect square and a perfect cube.

Practice

Completely factor each of the given polynomials. If a polynomial cannot be factored, write "not factorable." See Examples 1 through 4.

1. $x^2 - 25$
2. $y^2 - 121$
3. $81 - y^2$
4. $25 - z^2$
5. $2x^2 - 128$
6. $3x^2 - 147$
7. $4x^4 - 64$
8. $4x^2 + 49$
9. $y^2 - 16y + 64$
10. $z^2 + 18z + 81$

11. $-4x^2+100$

12. $-12x^4+3$

13. $9x^2-25$

14. $4x^2-49$

15. $y^2-10y+25$

16. $x^2+12x+36$

17. $4x^2-4x+1$

18. $49x^2-14x+1$

19. $25x^2+30x+9$

20. $9y^2+12y+4$

21. $16x^2-40x+25$

22. $9x^2-12x+4$

23. $2x^3y+32x^2y+128xy$

24. $3x^2y-30xy+75y$

25. $x^2-20x+100$

26. $25x^2-10x+1$

27. $x^4+10x^2y+25y^2$

28. $16x^4+8x^2y+y^2$

29. x^3-125

30. x^3-64

31. y^3+216

32. y^3+1

33. x^3+27y^3

34. $8x^3+1$

35. x^2+64y^2

36. $3x^3+81$

37. $4x^3-32$

38. $3x^4+375xy^3$

39. x^3y+y^4

40. x^4y^3-x

41. $x^2y^2-x^2y^5$

42. $2x^2-16x^2y^3$

43. $24x^4y+81xy^4$

44. x^6-64y^3

45. x^6-y^9

46. $64x^2+1$

47. $27x^3+y^6$

48. x^3+64z^3

49. $8x^3+y^3$

50. x^3+125y^3

51. $8y^3-8$

52. $36x^3+36$

53. $9x^2-y^2$

54. x^2-4y^2

55. x^4-16y^4

56. $81x^4-1$

57. m^2+7m+6

58. a^2-4a+3

59. $x^2+11x+18$

60. $y^2+8y+15$

61. $n^2-8n+12$

62. m^2-m-6

63. $a^2+2a+24$

64. $-x^2-12x-35$

65. $x^2+3x-10$

66. $x^2+9x-36$

67. $3a^2+12a-36$

68. $-2y^2+24y-70$

69. $-5x^2+70x-240$

70. $7t^2+14t-168$

71. $64+49t^2$

72. $3x^2-147$

73. x^3-4x^2-12x

74. $3n^3+15n^2+18n$

75. $112a-2a^2-2a^3$

76. $200x+20x^2-4x^3$

77. $-3x^2+17x-10$

78. $2x^2+7x+3$

79. $6x^2-11x+4$

80. $12x^2-32x+5$

81. $12m^2+m-6$

82. $6t^2+t-35$

83. $4x^2-14x+6$

84. $-4x^2+18x-20$

85. $8x^2+6x-35$

86. $12x^2+5x-3$

87. $20x^2-21x-54$

88. $21x^2-x-10$

89. $14+11x-15x^2$

90. $24+x-3x^2$

91. $20y^2+9y-20$

92. $35x^2-x-6$

93. $18x^2-15x+2$

94. $12x^2-47x+11$

95. $12n^2-60n-75$

96. $-12x^3-2x^2-70x$

97. $36x^3+21x^2-30x$

98. $63x-3x^2-30x^3$

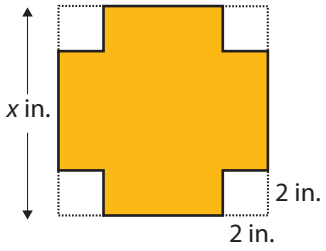
99. $16x^3-52x^2+22x$

100. $24y^3-4y^2-160y$

Solve.

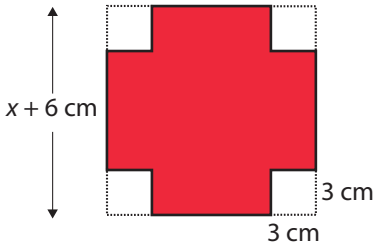
101. a. Represent the area of the shaded region of the square shown below as the difference of two squares.

b. Use the factors of the expression in Part **a.** to draw (and label the sides of) a rectangle that has the same area as the shaded region.



102. a. Use a polynomial function to represent the area of the shaded region of the square.

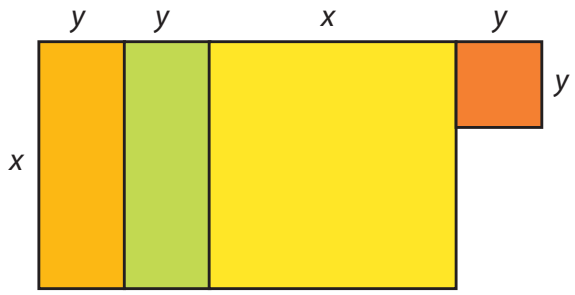
b. Use a polynomial function to represent the perimeter of the shaded figure.



Writing & Thinking

103. **a.** Show that the sum of the areas of the rectangles and squares in the figure is a perfect square trinomial.

b. Rearrange the rectangles and squares in the form of a square and represent its area as the square of a binomial.



104. Compound interest is interest earned on interest. If a principal P is invested and compounded annually (once a year) at a rate of r, then the amount, A_1 accumulated in one year is $A_1 = P + Pr$.
In factored form, we have $A_1 = P + Pr = P(1+r)$.
At the end of the second year the amount accumulated is
$A_2 = (P + Pr) + (P + Pr)r$.

a. Write the expression for A_2 in factored form similar to that for A_1.

b. Write an expression for the amount accumulated in three years, A_3, in factored form.

c. Write an expression for A_n the amount accumulated in n years.

d. Use the formula you developed in Part **c.** and your calculator to find the amount accumulated if \$10,000 is invested at 6% and compounded annually for 20 years.