Practice and Problem Solving

A Practice by Example

Examples 1, 2 (pages 481, 482)

Complete.

1. $t^2 + 7t + 10 = (t + 2)(t + \blacksquare)$
2. $y^2 - 13y + 36 = (y - 4)(y - \blacksquare)$
3. $x^2 - 8x + 7 = (x - 1)(x - \blacksquare)$
4. $x^2 + 9x + 18 = (x + 3)(x + \blacksquare)$

Factor each expression. Check your answer.

5. $r^2 + 4r + 3$
6. $n^2 - 3n + 2$
7. $k^2 + 5k + 6$
8. $y^2 + 6y + 8$
9. $x^2 - 2x + 1$
10. $p^2 + 19p + 18$
11. $k^2 - 16k + 28$
12. $w^2 + 6w + 5$
13. $m^2 - 9m + 8$
14. $d^2 + 21d + 38$
15. $t^2 - 13t + 42$
16. $q^2 - 18q + 45$

Example 3 (page 482)

Complete.

17. $m^2 + 3m - 10 = (m - 2)(m + \blacksquare)$
18. $v^2 - 2v - 24 = (v + 4)(v - \blacksquare)$
19. $k^2 - 8k - 9 = (k + 1)(k - \blacksquare)$
20. $q^2 + 3q - 18 = (q - 3)(q + \blacksquare)$

Factor each expression.

21. $x^2 + 3x - 4$
22. $q^2 - 2q - 8$
23. $y^2 + y - 20$
24. $h^2 + 16h - 17$
25. $x^2 - 14x - 32$
26. $d^2 + 6d - 40$
27. $m^2 - 13m - 30$
28. $p^2 + 3p - 54$
29. $p^2 - 15p - 54$

Example 4 (page 483)

Choose the correct factoring for each expression.

30. $p^2 + 10pq + 9q^2$ — **A.** $(p + 9q)(p + q)$ **B.** $(p + 9)(p + q^2)$

31. $m^2 + 4mn + 3n^2$ — **A.** $(m + n)(3m + n)$ **B.** $(m + 3n)(m + n)$

32. $x^2 + 8xy + 15y^2$ — **A.** $(x + 15y^2)(x + 1)$ **B.** $(x + 5y)(x + 3y)$

Factor each expression.

33. $t^2 + 7tv - 18v^2$ 34. $x^2 + 12xy + 35y^2$ 35. $p^2 - 10pq + 16q^2$

36. $m^2 - 3mn - 54n^2$ 37. $h^2 + 18hj + 17j^2$ 38. $x^2 - 10xy - 39y^2$

Open-Ended **Find three different values to complete each expression so that it can be factored into the product of two binomials. Show each factorization.**

39. $x^2 - 3x - \square$ 40. $x^2 + x - \square$ 41. $x^2 + \square x + 12$

42. **Writing** Suppose you can factor $x^2 + bx + c$ into the product of two binomials.
   a. Explain what you know about the factors if $c > 0$.
   b. Explain what you know about the factors if $c < 0$.

B Apply Your Skills

Factor each expression.

43. $k^2 + 10k + 16$ 44. $m^2 + 10m - 24$ 45. $n^2 + 10n - 56$

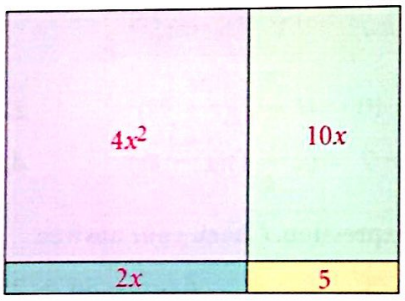
46. $g^2 + 20g + 96$ 47. $x^2 + 8x - 65$ 48. $t^2 + 28t + 75$

49. $x^2 - 11x - 42$ 50. $k^2 + 23k + 42$ 51. $m^2 + 14m - 51$

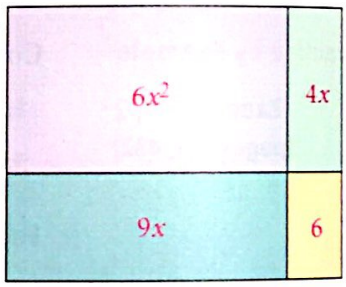
52. $x^2 + 29xy + 100y^2$ 53. $t^2 - 10t - 75$ 54. $d^2 - 19de + 48e^2$

Write the standard form for each of the polynomials modeled below. Then factor each expression.

55.



56.



57. **Critical Thinking** Let $x^2 - 12x - 28 = (x + a)(x + b)$.
   a. What do you know about the signs of a and b?
   b. Suppose $|a| > |b|$. Which number, a or b, is a negative integer? Explain.

58. **Critical Thinking** Let $x^2 + 12x - 28 = (x + a)(x + b)$.
   a. What do you know about the signs of a and b?
   b. Suppose $|a| > |b|$. Which number, a or b, is a negative integer? Explain.

C Challenge

Factor each trinomial.

Sample $n^6 + n^3 - 56 = n^{3+3} + n^3 - 56$
$= (n^3 + 8)(n^3 - 7)$

59. $x^{12} + 12x^6 + 35$ 60. $t^8 + 5t^4 - 24$ 61. $r^6 - 21r^3 + 80$

62. $m^{10} + 18m^5 + 17$ 63. $x^{12} - 19x^6 - 120$ 64. $p^6 + 14p^3 - 72$