EXERCISES

Practice and Problem Solving

For more practice, see *Extra Practice*.

A Practice by Example

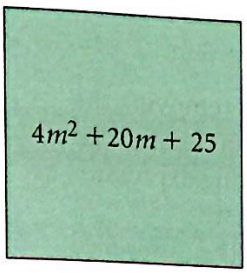
Example 1 (page 491)

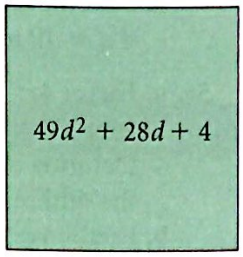
Factor each expression.

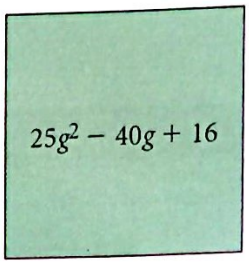
1. $c^2 + 10c + 25$
2. $x^2 - 2x + 1$
3. $h^2 + 12h + 36$
4. $m^2 - 24m + 144$
5. $k^2 - 16k + 64$
6. $t^2 - 14t + 49$

Example 2 (page 491)

Find the side length of each square.

7. 

8. 

9. 

Factor each expression. Check your answer.

10. $25g^2 - 30g + 9$
11. $64r^2 - 144r + 81$
12. $100v^2 - 220v + 121$

Example 3 (page 492)

13. $x^2 - 4$
14. $y^2 - 81$
15. $k^2 - 196$
16. $r^2 - 144$
17. $h^2 - 100$
18. $m^2 - 225$
19. $w^2 - 256$
20. $x^2 - 400$
21. $y^2 - 900$

Example 4 (page 492)

22. $25q^2 - 9$
23. $49y^2 - 4$
24. $9c^2 - 64$
25. $4m^2 - 81$
26. $16k^2 - 49$
27. $144p^2 - 1$
28. $81v^2 - 100$
29. $400n^2 - 121$
30. $25w^2 - 196$

Example 5 (page 492)

31. $3m^2 - 12$
32. $5k^2 - 245$
33. $3x^2 + 48x + 192$
34. $2t^2 - 36t + 162$
35. $6r^3 - 150r$
36. $7h^2 - 56h + 112$

B Apply Your Skills

37. **Writing** Summarize the procedure for factoring a perfect-square trinomial. Give at least two examples.

38. **Error Analysis** Suppose a classmate factored the binomial at the right. What error did your classmate make?

$$4x^2 - 121 = (4x - 11)(4x - 11)$$
$$= (4x - 11)^2$$

Mental Math **Find a pair of factors for each number by using the difference of two squares.**

Sample

$143 = 144 - 1$ — Write 143 as the difference of two squares.

$= 12^2 - 1^2$ — Rewrite 144 as 12^2 and 1 as 1^2.

$= (12 - 1)(12 + 1)$ — Factor.

$= (11)(13)$ — Simplify.

39. 99
40. 91
41. 75
42. 117
43. 224

44. a. **Open-Ended** Write an expression that is a perfect-square trinomial.
b. Explain how you know your trinomial is a perfect-square trinomial.

Factor each expression.

45. $100v^2 - 25w^2$

46. $16p^2 - 48pq + 36q^2$

47. $28c^2 + 140cd + 175d^2$

48. $\frac{1}{4}m^2 - \frac{1}{9}$

49. $x^2 + x + \frac{1}{4}$

50. $64g^2 - 192gh + 144h^2$

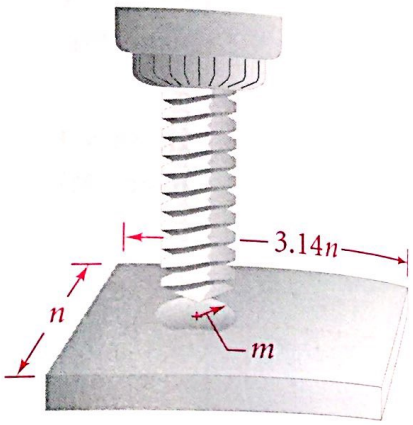
51. $\frac{1}{4}p^2 - 2p + 4$

52. $\frac{1}{9}n^2 - \frac{1}{25}$

53. $\frac{1}{25}k^2 + \frac{6}{5}k + 9$

54. a. Geometry Write an expression in terms of n and m for the area of the top of the solid region being drilled at the right. Use 3.14 for π. Factor your expression.

b. Find the area of the solid region if $n = 10$ in. and $m = 3$ in.



55. a. Factor $4x^2 - 100$ by removing the common monomial factor and then factoring the remaining expression as the difference of squares.

b. Factor $4x^2 - 100$ as the difference of squares, and then remove the common monomial factors.

c. Critical Thinking Why can $4x^2 - 100$ be factored in two different ways?

d. Can you factor $3x^2 - 75$ in the two ways you factored $4x^2 - 100$ in parts (a) and (b)? Explain your answer.

C Challenge

Factor each expression.

56. $64r^6 - 144r^3 + 81$

57. $p^6 + 40p^3q + 400q^2$

58. $36m^4 + 84m^2 + 49$

59. $81p^{10} + 198p^5 + 121$

60. $108m^6 - 147$

61. $x^{20} - 4x^{10}y^5 + 4y^{10}$

62. $256g^4 - 100h^6$

63. $45x^4 - 60x^2y + 20y^2$

64. $37g^8 - 37h^8$

65. a. The expression $(t - 3)^2 - 16$ is a difference of two squares. Identify a and b.

b. Factor $(t - 3)^2 - 16$ and simplify.

66. The binomial $16 - 81n^4$ can be factored twice as the difference of squares.

a. Factor $16 - 81n^4$ completely.

b. Critical Thinking What characteristics do 16 and $81n^4$ share that make this possible?

c. Open-Ended Write a binomial that can be factored twice as the difference of squares.