In Exercises 1–6, factor the polynomial. ▶ *Example 1*

1. $m^2 - 49$

2. $z^2 - 81$

3. $64 - 81d^2$

4. $25 - 4x^2$

5. $225a^2 - 36b^2$

6. $16x^2 - 169y^2$

In Exercises 7–12, use a special product pattern to evaluate the expression. ▶ *Example 2*

7. $12^2 - 9^2$

8. $19^2 - 11^2$

9. $78^2 - 72^2$

10. $54^2 - 52^2$

11. $53^2 - 47^2$

12. $39^2 - 36^2$

In Exercises 13–20, factor the polynomial. ▶ *Example 3*

13. $h^2 + 12h + 36$

14. $p^2 + 30p + 225$

15. $y^2 - 22y + 121$

16. $x^2 - 4x + 4$

17. $a^2 - 28a + 196$

18. $m^2 + 24m + 144$

19. $25n^2 + 20n + 4$

20. $49a^2 - 14a + 1$

ERROR ANALYSIS In Exercises 21 and 22, describe and correct the error in factoring the polynomial.

21.

✗
$$n^2 - 64 = n^2 - 8^2$$
$$= (n - 8)^2$$

22.

✗
$$y^2 - 6y + 9 = y^2 - 2(y)(3) + 3^2$$
$$= (y - 3)(y + 3)$$

23. **MODELING REAL LIFE** The area (in square centimeters) of a square drink coaster can be represented by $d^2 + 8d + 16$. Write an expression that represents the perimeter of the coaster.

24. **MODELING REAL LIFE**
The polynomial represents the area (in square feet) of the square playground. Write an expression that represents the perimeter of the playground.

$A = x^2 - 30x + 225$
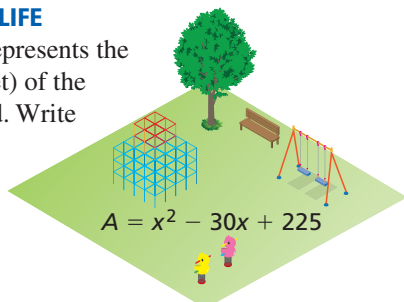
In Exercises 25–32, solve the equation. ▶ *Example 4*

25. $z^2 - 4 = 0$

26. $4x^2 = 49$

27. $k^2 - 16k + 64 = 0$

28. $s^2 + 20s + 100 = 0$

29. $n^2 + 9 = 6n$

30. $y^2 = 12y - 36$

31. $y^2 + \frac{1}{2}y = -\frac{1}{16}$

32. $-\frac{4}{3}x + \frac{4}{9} = -x^2$

33. **MODELING REAL LIFE**
While standing on a ladder, you drop a roller. The function

$y = 25 - 16t^2$

represents the height y (in feet) of the roller t seconds after it is dropped. After how many seconds does the roller land on the ground?
▶ *Example 5*

34. **MODELING REAL LIFE**
The function

$y = -16t^2 + 8t$

represents the height y (in feet) of a grasshopper jumping straight up from the ground t seconds after the start of the jump. After how many seconds is the grasshopper 1 foot off the ground?

In Exercises 35–38, factor the polynomial.

35. $3z^2 - 27$

36. $2m^2 - 50$

37. $50y^2 + 120y + 72$

38. $27m^2 - 36m + 12$

39. **MP REASONING** Tell whether each polynomial can be factored. If not, change the constant term so that the polynomial is a perfect square trinomial.

    a. $w^2 + 18w + 84$

    b. $y^2 - 10y + 23$