Practice with Examples

For use with pages 345–351

GOAL How to factor polynomial expressions and use factoring to solve polynomial equations

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VOCABULARY

Two special factoring patterns are given below.

Sum of Two Cubes   **Difference of Two Cubes**

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

To **factor by grouping**, group pairs of terms that have a common monomial factor together, factor out this common factor and look for a pattern. An expression of the form $au^2 + bu + c$ where u is any expression in x is said to be in **quadratic form.**

EXAMPLE 1 *Factoring the Sum or Difference of Cubes*

Factor each polynomial.

a. $64x^3 + 1 = (4x)^3 + 1^3$ Sum of two cubes

$= (4x + 1)(16x^2 - 4x + 1)$

b. $54x^3 - 16 = 2(27x^3 - 8)$ Factor common monomial.

$= 2[(3x)^3 - 2^3]$ Difference of two cubes

$= 2(3x - 2)(9x^2 + 6x + 4)$

Exercises for Example 1

Factor the polynomial.

1. $x^3 + 125$ **2.** $x^3 - 343$ **3.** $64x^3 - 1$

4. $8x^3 + 27$ **5.** $3x^3 - 24$ **6.** $1000x^3 - 729$

Factor the polynomial.

25. $16x^4 - 81$

26. $x^4 - 9$

31. $2x^4 - 200x^2$

32. $8x^4 - 18x^2$

33. $27x^4 - 3x^2$

34. $3x^4 - 3$