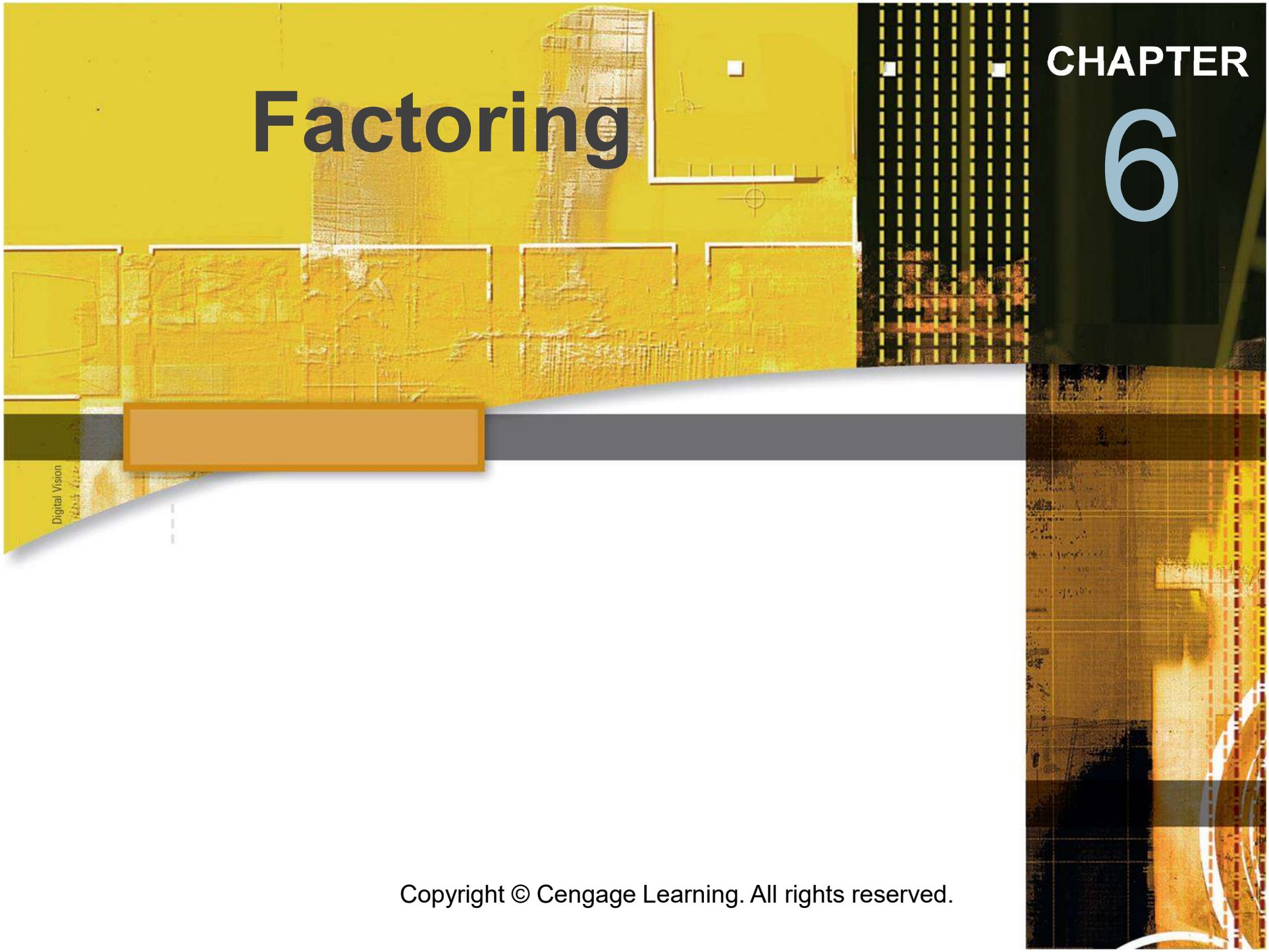

6.5 Factor Polynomials Completely

Objective

1. Factor completely

Factor completely

Factor completely

When factoring a polynomial completely, ask the following questions about the polynomial.

1. Is there a common factor? If so, factor out the GCF.

2. If the polynomial is a binomial, is it the difference of two perfect squares, the sum of two perfect cubes, or the difference of two perfect cubes? If so, factor.

3. If the polynomial is a trinomial, is it a perfect-square trinomial or the product of two binomials? If so, factor.

Factor completely

4. If the polynomial has four terms, can it be factored by grouping? If so, factor.

5. Is each factor nonfactorable over the integers? If not, factor.

Example 1

Factor. **A.** $x^2y + 2x^2 - y - 2$ **B.** $x^6 - y^6$

C. $4x^2y^2 + 12xy^2 + 9y^2$

Solution:

A. $x^2y + 2x^2 - y - 2$

$= (x^2y + 2x^2) - (y + 2)$ **Factor by grouping.**

$= x^2(y + 2) - (y + 2)$

$= (y + 2)(x^2 - 1)$

$= (y + 2)(x + 1)(x - 1)$ **Factor the difference of two perfect squares.**

Example 1 – *Solution*

cont'd

B. $x^6 - y^6$

$= (x^3)^2 - (y^3)^2$ Write $x^6 - y^6$ as the difference of two squares.

$= (x^3 - y^3)(x^3 + y^3)$ Factor the difference of two squares.

$= (x - y)(x^2 + xy + y^2)(x + y)(x^2 - xy + y^2)$ Factor the difference of two cubes and the sum of two cubes.

Example 1 – *Solution*

cont'd

C. $4x^2y^2 + 12xy^2 + 9y^2$

$= y^2(4x^2 + 12x + 9)$

The GCF of the terms is y^2. Factor out the common factor.

$= y^2(2x + 3)^2$

Factor the perfect-square trinomial.