

### Lesson 4-3

#### Example 1 Identify Numbers as Prime or Composite

**a. Determine whether 31 is a prime number.**

Find factors of 31 by listing the whole number pairs whose product is 31.

$$31 = 1 \times 31$$

The number 31 has only two factors. Therefore, 31 is a prime number.

**b. Determine whether 42 is a composite number.**

Find factors of 42 by listing the whole number pairs whose product is 42.

$$42 = 1 \times 42$$

$$42 = 2 \times 21$$

$$42 = 3 \times 14$$

$$42 = 6 \times 7$$

The factors of 42 are 1, 2, 3, 6, 7, 14, 21, and 42. Since the number has more than two factors, it is composite.

#### Example 2 Write Prime Factorization

Write the prime factorization of 24.



$$24 = 4 \cdot 6$$

$$4 = 2 \cdot 2; 6 = 2 \cdot 3$$

The factorization is complete because 2 and 3 are prime numbers. The prime factorization of 24 is  $2 \cdot 2 \cdot 2 \cdot 3$  or  $2^3 \cdot 3$ .

#### Example 3 Factor Monomials

Factor each monomial.

**a.  $12c^3d$**

$$12c^3d = 2 \cdot 2 \cdot 3 \cdot c^3 \cdot d$$

$$= 2 \cdot 2 \cdot 3 \cdot c \cdot c \cdot c \cdot d$$

$$12 = 2 \cdot 2 \cdot 3$$

$$c^3 = c \cdot c \cdot c$$

**b.  $-18ab^2$**

$$-18ab^2 = -1 \cdot 2 \cdot 3 \cdot 3 \cdot a \cdot b^2$$

$$= -1 \cdot 2 \cdot 3 \cdot 3 \cdot a \cdot b \cdot b$$

$$-18 = -1 \cdot 2 \cdot 3 \cdot 3$$

$$b^2 = b \cdot b$$