Check Up

1. Determine the GCF of x^3y^4 and $4xy^3$.

✓ Compare your answers.

1. Determine the GCF of x^3y^4 and $4xy^3$.

   x^3y^4: $1, x, x^2, x^3, y, y^2, y^3, y^4$

   $4xy^3$: $1, 2, 4, x, y, y^2, y^3$

   The GCF of x^3y^4 and $4xy^3$ is $1xy^3$, or xy^3.

B. Writing a Monomial as the Product of its Factors

Once the GCF of a group of monomials has been determined, each monomial can be written as the product of the GCF and another monomial factor. The other monomial factor can be determined by dividing the original monomial by the GCF.

Example 1

The GCF of $20p^2q^2$ and $45p^3q^4$ is $5p^2q^2$. Write each monomial as a product of the GCF and another monomial factor.

Divide each monomial by the GCF, $5p^2q^2$.

$$\frac{20p^2q^2}{5p^2q^2} = 4 \qquad\qquad \frac{45p^3q^4}{5p^2q^2} = 9pq^2$$

$20p^2q^2 = (5p^2q^2)(4)$ and $45p^3q^4 = (5p^2q^2)(9pq^2)$

Check Up

1. Write each of $18ab^3$ and $27a^3b$ as the product of their GCF and another monomial factor.

☑ Compare your answers.

1. Write each of $18ab^3$ and $27a^3b$ as the product of their GCF and another monomial factor.

   Determine the GCF.

   $18ab^3$: $1, 2, 3, 6, 9, 18, a, b, b^2, b^3$

   $27a^3b$: $1, 3, 9, 27, a, a^2, a^3, b$

   The GCF is $9ab$.

   $$\frac{18ab^3}{9ab} = 2b^2 \qquad\qquad \frac{27a^3b}{9ab} = 3a^2$$

   $18ab^3 = (9ab)(2b^2)$ and $27a^3b = (9ab)(3a^2)$

C. Factoring Polynomials using the Greatest Common Factor

A polynomial can be factored using the GCF of its terms. Because the GCF is a factor of all of the terms, the distributive property can be used in reverse to show the GCF multiplied by a simpler polynomial factor.

For example, $(5x^2y)(y^2) + (5x^2y)(2y) - (5x^2y)(4)$ has a GCF of $5x^2y$ and can be rewritten as $5x^2y(y^2 + 2y - 4)$, using the distributive property in reverse.

Example 1

Factor $4x^3 - 16x^2 - 20x$ using the GCF of its terms.

Determine the GCF.

$$4x^3 = 2 \cdot 2 \cdot x \cdot x \cdot x$$
$$-16x^2 = -1 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot x \cdot x$$
$$-20x = -1 \cdot 2 \cdot 2 \cdot 5 \cdot x$$

The GCF is $4x$.

Write each term as the product of the GCF and another monomial factor.

$$4x^3 - 16x^2 - 20x = (4x)(x^2) - (4x)(4x) - (4x)(5)$$

Use the distributive property in reverse.

$$4x^3 - 16x^2 - 20x = (4x)(x^2) - (4x)(4x) - (4x)(5)$$
$$= 4x(x^2 - 4x - 5)$$