

## Lesson 4-4

### Example 1 Find the GCF Find the GCF of 18 and 24.

**Method 1** List the factors.

Factors of 18: 1, 2, 3, 6, 9, 18

Factors of 24: 1, 2, 3, 4, 6, 8, 12, 24

The greatest common factor of 18 and 24 is 6.

**Method 2** Use prime factorization.

$$18 = 2 \cdot 3 \cdot 3$$

$$24 = 2 \cdot 2 \cdot 2 \cdot 3$$

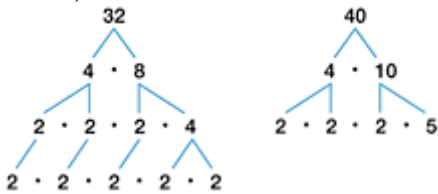
The GCF is the product of the common prime factors.

$$2 \cdot 3 = 6$$

Again, the GCF of 18 and 24 is 6.

### Example 2 Find the GCF Find the GCF of each set of numbers.

a. 32, 40



First, factor each number completely.

$$32 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$$

$$40 = 2 \cdot 2 \cdot 2 \cdot 5$$

The GCF of 32 and 40 is  $2 \cdot 2 \cdot 2$  or 8.

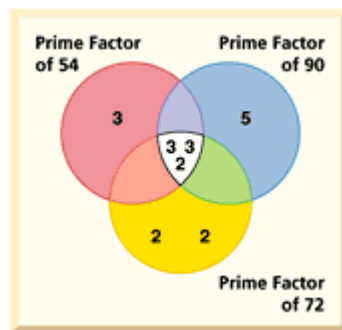
b. 72, 90, 54

$$72 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$$

$$90 = 2 \cdot 3 \cdot 3 \cdot 5$$

$$54 = 2 \cdot 3 \cdot 3 \cdot 3$$

The GCF is  $2 \cdot 3 \cdot 3$  or 18.



**Example 3 Use the GCF to Solve Problems**

**SCHOOL** There are 96 boys and 68 girls in the third grade at Sunshine Elementary School.

- a. What is the greatest number of third grade classes that can be formed if each class has the same number of boys and each class has the same number of girls?

Find the GCF of 96 and 64.

$$96 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3$$

$$68 = 2 \cdot 2 \cdot 17$$

The greatest common factor of 96 and 68 is  $2 \cdot 2$  or 4.

So, 4 third grade classes can be formed.

- b. How many boys and girls will be in each class?

$$96 \div 4 = 24 \text{ and } 68 \div 4 = 17$$

So, each class will have 24 boys and 17 girls.

**Example 4 Find the GCF of Monomials**

**Find the GCF of  $12xy^3$  and  $20x^2y^2$ .**

Completely factor each expression.

$$12xy^3 = 2 \cdot 2 \cdot 3 \cdot x \cdot y \cdot y \cdot y$$

$$20x^2y^2 = 2 \cdot 2 \cdot 5 \cdot x \cdot x \cdot y \cdot y$$

The GCF of  $12xy^3$  and  $20x^2y^2$  is  $2 \cdot 2 \cdot x \cdot y \cdot y$  or  $4xy^2$ .

**Example 5 Factor Monomials**

**Factor  $4x + 12$**

First, find the GCF of  $4x$  and 12.

$$4x = 2 \cdot 2 \cdot x$$

$$12 = 2 \cdot 2 \cdot 3 \quad \text{The GCF is 4.}$$

Now write each term as a product of the GCF and its remaining factors.

$$4x + 12 = 4(x) + 4(3)$$

$$= 4(x + 3) \quad \text{Distributive Property}$$

So,  $4x + 12 = 4(x + 3)$ .