

## 1.5 Greatest Common Factor

### ESSENTIAL QUESTION

How can you find the greatest common factor of two numbers?

### COMMON CORE STATE STANDARDS

6.NS.4 Find the greatest common factor of two whole numbers less than or equal to 100...

6.EE.2b Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient);...

List the factors of the numbers

6 → 1, 6    2, 3    12 → 1, 12    3, 4    2, 6

The numbers 6 and 12 have common factors of 1, 2, 3, and 6.

**COMMON FACTORS** → Factors that are shared by two or more numbers.

**GREATEST COMMON FACTOR (GCF)** → The biggest factor that is shared by two or more numbers.

One way to find the GCF of two or more numbers is by listing factors.

GCF of  
16 and 35

**EXAMPLE 1** Finding the GCF Using Lists of Factors

Find the GCF of 24 and 40.

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

Factors of 40 → 1, 40, 2, 20, 4, 10, 5, 8

Another way to find the GCF of two or more numbers is by using prime factorization.

Greatest  
Common Factor is 8

**EXAMPLE 2** Finding the GCF Using Prime Factorizations

Find the GCF of 12 and 56.

```

    12      56
   / \    / \
  3  4   8  7
   / \   / \
  2  2  2  4
         / \
        2  2
    
```

Find the GCF of the numbers using prime factorization.

8, 36

```

    8      36
   / \    / \
  2  4   6  6
   / \   / \
  2  2  2  3
         / \
        2  2
    
```

12 = 2 · 2 · 3  
 56 = 2 · 2 · 2 · 7

Circle the common prime factors

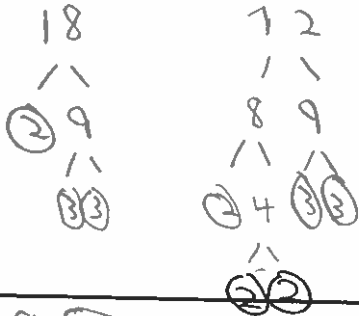
2 · 2 = 4  
 GCF = 4

8 = 2 · 2 · 2  
 36 = 2 · 2 · 3 · 3

2 · 2 = 4  
 GCF = 4

Find the GCF of the numbers using prime factorization.

18, 72



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

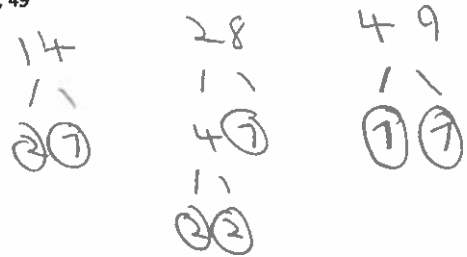
$$72 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$$

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

$$\text{GCF} = 18$$

Find the GCF of the numbers using prime factorization.

14, 28, 49



$$14 = 2 \cdot 7$$

$$28 = 2 \cdot 2 \cdot 7$$

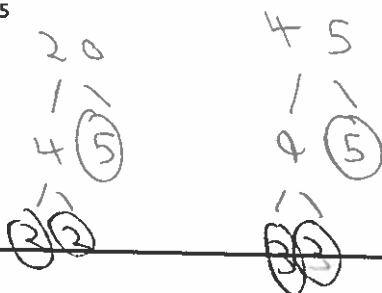
$$49 = 7 \cdot 7$$

$$\text{GCF} = 7$$

**On Your Own**

Find the GCF of the numbers using prime factorization.

1. 20, 45



$$20 = 2 \cdot 2 \cdot 5$$

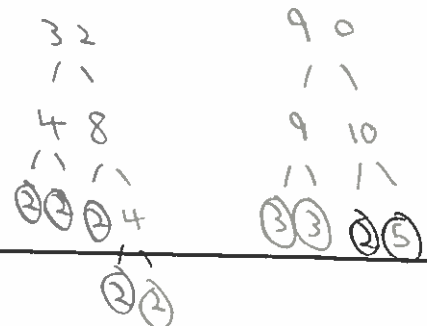
$$45 = 3 \cdot 3 \cdot 5$$

$$\text{GCF} = 5$$

**On Your Own**

Find the GCF of the numbers using prime factorization.

2. 32, 90



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

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

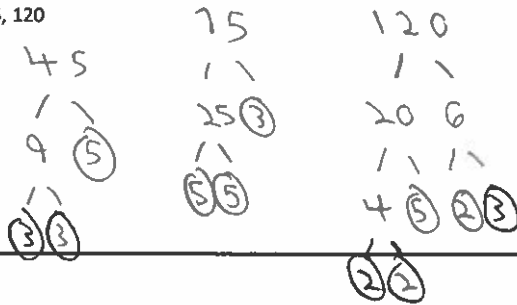
$$\text{GCF} = 2$$

# Find the GCF

## On Your Own

Find the GCF of the numbers using prime factorization.

3. 45, 75, 120



$$45 = 3 \cdot 3 \cdot 5$$

$$75 = 3 \cdot 5 \cdot 5$$

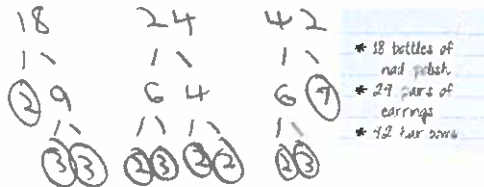
$$120 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 5$$

$$3 \cdot 5 = 15$$

$$\text{GCF} = 15$$

## EXAMPLE 4 Real-Life Application

You are filling pinatas for your sister's birthday party. The list shows the gifts you are putting into the pinatas. You want identical groups of gifts in each pinata with no gifts left over. What is the greatest number of pinatas you can make?



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

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

$$42 = 2 \cdot 3 \cdot 7$$

$$\text{GCF} = 2 \cdot 3 = 6$$

You can make 6 pinat.

## EXAMPLE 3 Finding Two Numbers with a Given GCF

Which pair of numbers has a GCF of 15?

- a. 10, 15   b. 30, 60   c. 21, 45   d. 45, 75