

# 4th Grade Math: Improper Fractions

## Lesson Objective:

By the end of this lesson, students will be able to:

- Understand what improper fractions are.
  - Convert improper fractions to mixed numbers and vice versa.
  - Compare and order improper fractions.
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## 1. Introduction to Improper Fractions

### What is an Improper Fraction?

- An **improper fraction** is a fraction where the numerator (top number) is greater than or equal to the denominator (bottom number).
- Unlike proper fractions where the numerator is smaller than the denominator, improper fractions represent a value that is equal to or greater than 1.

Examples:

- $\frac{5}{3}$ ,  $\frac{9}{8}$ , and  $\frac{7}{7}$  are improper fractions.
- $\frac{3}{4}$  is a proper fraction, as the numerator is less than the denominator.

**Key Concept:** Improper fractions often represent a whole number and a fractional part, which can be expressed as a **mixed number**.

## 2. Visualizing Improper Fractions

Visual Representation:

- Use diagrams (like pizza slices or fraction bars) to help students understand how improper fractions work.

**Example:** For  $\frac{5}{4}$ :

- Imagine 5 parts of a pizza, with each pizza cut into 4 slices. You have more than one whole pizza.

### 3. Converting Improper Fractions to Mixed Numbers

Steps to Convert:

1. Divide the numerator by the denominator.
2. The quotient (result of division) becomes the whole number.
3. The remainder becomes the numerator of the fraction.
4. The denominator stays the same.

**Example 1:** Convert  $\frac{9}{4}$  to a mixed number.

1. Divide 9 by 4:  $9 \div 4 = 2$  with a remainder of 1.
2. The quotient is 2, so the whole number is 2.
3. The remainder is 1, so the fraction is  $\frac{1}{4}$ .
4. The mixed number is  $2\frac{1}{4}$ .

**Example 2:** Convert  $\frac{7}{3}$  to a mixed number.

1. Divide 7 by 3:  $7 \div 3 = 2$  with a remainder of 1.
2. The quotient is 2, so the whole number is 2.
3. The remainder is 1, so the fraction is  $\frac{1}{3}$ .
4. The mixed number is  $2\frac{1}{3}$ .

## 4. Converting Mixed Numbers to Improper Fractions

Steps to Convert:

1. Multiply the whole number by the denominator.
2. Add the result to the numerator.
3. Keep the denominator the same.

**Example 1:** Convert  $3\frac{2}{5}$  to an improper fraction.

1. Multiply the whole number by the denominator:  $3 \times 5 = 15$ .
2. Add the numerator to the product:  $15 + 2 = 17$ .
3. The improper fraction is  $\frac{17}{5}$ .

**Example 2:** Convert  $2\frac{3}{8}$  to an improper fraction.

1. Multiply the whole number by the denominator:  $2 \times 8 = 16$ .
2. Add the numerator to the product:  $16 + 3 = 19$ .
3. The improper fraction is  $\frac{19}{8}$ .

## 5. Comparing Improper Fractions

Steps for Comparing:

1. If the denominators are the same, compare the numerators directly.
  - The larger the numerator, the greater the fraction.
2. If the denominators are different, find a common denominator and then compare the numerators.

**Example 1:** Compare  $\frac{7}{4}$  and  $\frac{9}{4}$ .

- The denominators are the same.
- Compare the numerators: 9 is greater than 7, so  $\frac{9}{4}$  is greater than  $\frac{7}{4}$ .

**Example 2:** Compare  $\frac{5}{6}$  and  $\frac{7}{8}$ .

- The denominators are different.
- Find a common denominator (24):
  - $\frac{5}{6} = \frac{20}{24}$
  - $\frac{7}{8} = \frac{21}{24}$
- Since 21 is greater than 20,  $\frac{7}{8}$  is greater than  $\frac{5}{6}$ .

## 6. Practice Problems

### 1. Convert Improper Fractions to Mixed Numbers:

- Convert  $\frac{8}{3}$  to a mixed number.
- Convert  $\frac{11}{5}$  to a mixed number.

### 2. Convert Mixed Numbers to Improper Fractions:

- Convert  $2\frac{2}{7}$  to an improper fraction.
- Convert  $4\frac{1}{6}$  to an improper fraction.

### 3. Compare the Improper Fractions:

- Compare  $\frac{13}{5}$  and  $\frac{12}{5}$ .
- Compare  $\frac{7}{9}$  and  $\frac{4}{7}$ .

## 7. Real-World Application

**Problem 1:** A recipe calls for  $3\frac{1}{4}$  cups of flour. You only have a measuring cup that measures  $\frac{1}{4}$  cup. How many times would you need to fill the  $\frac{1}{4}$  cup to get the right amount of flour?

**Solution:** Convert  $3\frac{1}{4}$  to an improper fraction:

- $3 \times 4 + 1 = 13$ , so  $3\frac{1}{4} = \frac{13}{4}$ . You will need to fill the  $\frac{1}{4}$  cup 13 times.

**Problem 2:** John ate  $2\frac{1}{3}$  pizzas, and Sarah ate  $1\frac{3}{4}$  pizzas. How much pizza did they eat together?

**Solution:** Convert the mixed numbers to improper fractions:

- $2\frac{1}{3} = \frac{7}{3}$
- $1\frac{3}{4} = \frac{7}{4}$  Find a common denominator and add the fractions:
- Common denominator is 12.
- $\frac{7}{3} = \frac{28}{12}$ ,  $\frac{7}{4} = \frac{21}{12}$
- $\frac{28}{12} + \frac{21}{12} = \frac{49}{12} = 4\frac{1}{12}$ . Together, they ate  $4\frac{1}{12}$  pizzas.

## 8. Review and Wrap-Up

- **Recap Key Concepts:**
  - Improper fractions have numerators greater than or equal to denominators.
  - You can convert between improper fractions and mixed numbers.
  - Understanding how to compare improper fractions helps in real-world situations.
- **Class Discussion:**
  - Why do we convert improper fractions to mixed numbers in certain situations (e.g., cooking, dividing objects)?
  - Can improper fractions be easier to use in some cases?