

Class 7 Mathematics: Fractions

Understanding Concepts

Types

Operations

Real-World Applications



Learning Objectives

Key Goals for Today:

- Recall basic definitions and components of fractions.
- Identify and classify types of fractions.
- Convert between Improper Fractions and Mixed Fractions.
- Master Addition, Subtraction, Multiplication, and Division of Fractions.
- Solve real-world word problems using fractions.

What is a Fraction?

- **Definition:** A fraction represents a numerical value that is part of a whole quantity or collection.
- **General Form:** fraction (a/b) where b is not equal to 0
- **Components:**
 - **Numerator (a):** Represents the number of equal parts taken.
 - **Denominator (b):** Represents the total number of equal parts in the whole.



Visualizing Fractions

- **Example 1:** A pizza cut into 8 equal slices
 - If you eat 3 slices, the fraction eaten is fraction $\frac{3}{8}$.
- **Example 2:** A grid of 10 equal squares with 7 shaded squares.
 - Shaded portion = $\frac{7}{10}$
 - Unshaded portion = $\frac{3}{10}$



Types of Fractions (Overview)

- **Proper Fractions:** Numerator $<$ Denominator
- **Improper Fractions:** Numerator $(\geq)$ Denominator
-
- **Mixed Fractions:** Whole Number + Proper Fraction
- **Like & Unlike Fractions:** Categorized by Denominator comparison
- **Equivalent Fractions:** Represent the same portion



Proper Fractions

- **Definition:** A fraction where the numerator is strictly less than the denominator
- **Value:** Proper fraction value is always less than 1 unit.
- **Examples:**
 - $1/2$, $3/5$, $7/12$, $9/10$
- **Key Note:** Proper fractions represent an amount smaller than a single whole item.



Improper & Mixed Fractions

- **Improper Fraction:** Numerator is greater than or equal to the denominator.
 - Examples: $7/4$, $11/3$, $5/2$ (Value is ≥ 1)
- **Mixed Fraction:** Combination of a non-zero whole number and a proper fraction.
 - Examples: $1(3/4)$, $3(2/3)$, $2(1/2)$



Conversion: Improper to Mixed Fraction

- **Rule:** Divide Numerator by Denominator.

Mixed Fraction=Quotient(Remainder/Denominator)

- **Worked Example:** Convert $17/5$
 - 17 divide by $5 = 3$ with Remainder 2
 - $17/5 = 3(2/5)$

Conversion: Mixed to Improper Fraction

- **Rule:**

Improper Fraction =
$$\frac{(\text{Whole Number} \times \text{Denominator}) + \text{Numerator}}{\text{Denominator}}$$

formula of improper fraction

- **Worked Example:** Convert $4\frac{2}{3}$

- $$\frac{(4 \times 3) + 2}{3} = \frac{(12 + 2)}{3} = \frac{14}{3}$$



Like and Unlike Fractions

- **Like Fractions:** Fractions having identical denominators.
 - Examples: $\frac{2}{7}$, $\frac{4}{7}$, $\frac{6}{7}$
- **Unlike Fractions:** Fractions having different denominators.
 - Examples: $\frac{1}{3}$, $\frac{2}{5}$, $\frac{3}{8}$

Equivalent Fractions

- **Definition:** Fractions that have different numerators and denominators but equal numerical values.
- **Method:** Multiply or divide both numerator and denominator by the same non-zero integer.

- **Example:**

$$\frac{1}{2} = \frac{1 \times 2}{2 \times 2} = \frac{2}{4}$$

$$\frac{1 \times 3}{2 \times 3} = \frac{3}{6}$$

Simplest (Lowest) Form of a Fraction

- **Definition:** A fraction is in simplest form when its numerator and denominator share no common factors other than 1.
- **Method:** Divide both numbers by their Highest Common Factor (HCF).
- **Worked Example:** Simplify $\{18/24\}$
 - $\text{HCF}(18, 24) = 6$
 - $$\frac{\{18 \div 6\}}{24 \div 6} = \frac{\{3\}}{4}$$



Comparing Fractions (Like & Benchmark)

- **Case 1: Like Denominators**

- Compare numerators directly.
- $\{5/9\} > \{2/9\}$ because $5 > 2$

- **Case 2: Same Numerators**

- Smaller denominator represents larger value.
- $\{3/5\} > \{3/8\}$

Comparing Unlike Fractions (LCM Method)

- **Step 1:** Find the Lowest Common Multiple (LCM) of denominators.
- **Step 2:** Convert unlike fractions to equivalent like fractions.
- **Worked Example:**
 - Compare $\{2/3\}$ and $\{3/4\}$
LCM (3, 4) = 12
 $\{\underline{2 \times 4}\} = \{\underline{8}\}$ and $\{\underline{3 \times 3}\} = \{\underline{9}\}$
 $3 \times 4 \quad 12 \quad 4 \times 3 \quad 12$
 - Since $\{8/12\} < \{9/12\}$, $\{2/3\} < \{3/4\}$



Addition of Like Fractions

- **Rule:** Add numerators, keep denominator unchanged.

$$\{a/c\} + \{b/c\} = \{a + b\}/\{c\}$$

- **Worked Example:**

$$\{3/8\} + \{4/8\} = \{3 + 4\} / \{8\} = \{7/8\}$$

Addition of Unlike Fractions

- **Step 1:** Find LCM of denominators.
- **Step 2:** Convert to equivalent fractions with LCM as common denominator.
- **Step 3:** Add numerators and simplify.
- **Worked Example:** Calculate $\{1/3\} + \{2/5\}$
 - $\text{LCM}(3, 5) = 15$
 - $$\frac{\{1 \times 5\}}{15} + \frac{\{2 \times 3\}}{15} = \frac{\{5\}}{15} + \frac{\{6\}}{15} = \frac{\{11\}}{15}$$



Subtraction of Fractions

- **Rule:** Subtract numerators across equal denominators.
- **Worked Example (Unlike Fractions):** Evaluate $\{5/6\} - \{1/4\}$
 - LCM (6, 4) = 12
 - $$\frac{\{5 \times 2\}}{12} - \frac{\{1 \times 3\}}{12} = \frac{\{10\}}{12} - \frac{\{3\}}{12} = \frac{7}{12}$$

Multiplication of Fractions

- **Rule:** Multiply numerators together and denominators together.

$$\{\text{Product}\} = \frac{\text{Numerator} \times \text{Numerator}}{\text{Denominator} \times \text{Denominator}}$$

- **Worked Example:**

$$\{3/4\} \times \{5/7\} = \frac{3 \times 5}{4 \times 7} = \frac{15}{28}$$

Fraction as an Operator "Of"

- **Concept:** The term "**of**" denotes multiplication.

- **Worked Example**

- **1:** Find $\{1/2\}$ of 20

$$\{1/2\} \times 20 = \{20/2\} = 10$$

Worked Example

- **2:** Find $\{3/4\}$ of 12 km

$$\{3/4\} \times 12 = 3 \times 3 = 9 \text{ km}$$



Reciprocal of a Fraction

- **Definition:** Interchanging the numerator and denominator of a non-zero fraction.
- **Property:** The product of a fraction and its reciprocal equals 1.
- **Examples:**
 - Reciprocal of $\{3/5\}$ is $\{5/3\}$
 - Reciprocal of $(7/1)$ is $(1/7)$



Division of Fractions

- **Rule:** Multiply the dividend by the reciprocal of the divisor.

$$\{a/b\} \div \{c/d\} = \{a/b\} \times \{d/c\}$$

- **Worked Example:** Calculate $\{4/9\} \div \{2/3\}$

$$\{4/9\} \times \{3/2\} = \{4 \times 3\} / \{9 \times 2\}$$

$$=\{12/18\} = \{2/3\}$$



Practical Applications & Word Problems

•**Problem:** Rahul spends $\frac{1}{4}$ of his daily study time on Math and $\frac{1}{3}$ on Science. What total fraction of time does he spend on both subjects?

•**Solution:**

•Total Fraction = $\left\{\frac{1}{4}\right\} + \left\{\frac{1}{3}\right\}$

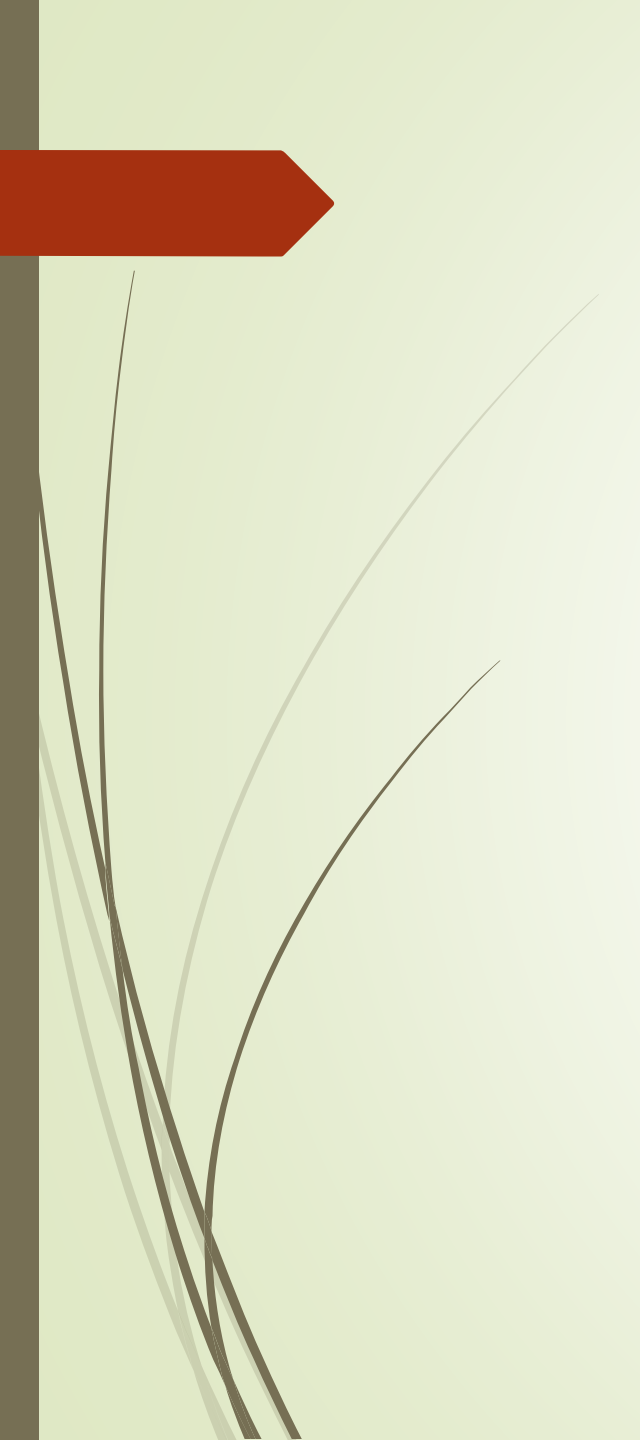
• $\{\text{LCM}\}(4, 3) = 12$

• $\left\{\frac{3}{12}\right\} + \left\{\frac{4}{12}\right\} = \left\{\frac{7}{12}\right\}$ of his total study time.



Common Errors to Avoid

-  Adding denominators when adding fractions $\{1/2\}$
 $+ \{1/3\} \neq \{2/5\}$.
-  Forgetting to invert the second fraction when performing division.
-  Converting mixed fractions incorrectly before multiplying or dividing.



Quick Practice / Quiz

1. Convert $23/4$ into a mixed fraction.

2. Evaluate: $(3/5) * (10/9)$

3. Simplify: $(7/10) - (2/5)$

4. Find the reciprocal of $2(1/3)$



Summary & Thank You

- **Key Takeaways:**

- Fractions represent parts of a whole
- Always convert unlike fractions using LCM for addition/subtraction.
- Divide fractions by multiplying by the reciprocal.

- **Questions?**

- *Thank You!*