Section 6.2: Fraction Addition and Subtraction

ADDITION OF FRACTIONS

- **Addition of Fractions with Common Denominators**: Let $\frac{a}{b}$ and $\frac{c}{b}$ be any fractions. Then $\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b}$.

- **Addition of Fractions with Different Denominators**: To add fractions with different denominators, we must first obtain a common denominator.

Example 1: Simplify each of the following problems.

(a) $\frac{3}{4} + \frac{2}{3} =$

(b) $\frac{1}{6} + \frac{7}{8} =$

(c) $3\frac{1}{4} + 2\frac{3}{8} =$

(d) $4\frac{3}{8} + 1\frac{3}{5} =$

Properties of Fraction Addition

- **Closure Property:** The sum of two fractions is a fraction.
- **Commutative Property:** $\frac{a}{b} + \frac{c}{b} = \frac{c}{b} + \frac{a}{b}$
- **Associative Property:** $\frac{a}{b} + \left(\frac{c}{b} + \frac{d}{b}\right) = \left(\frac{a}{b} + \frac{c}{b}\right) + \frac{d}{b}$
- **Additive Identity Property:** Zero is the additive identity. Therefore,

$$\frac{a}{b} + 0 = \frac{a}{b} = \frac{a}{b} + 0.$$

SUBTRACTION OF FRACTIONS

- **Subtraction of Fractions with Common Denominators**: Let $\frac{a}{b}$ and $\frac{c}{b}$ be any fractions. Then $\frac{a}{b} - \frac{c}{b} = \frac{a-c}{b}$.
- **Subtraction of Fractions with Different Denominators**: To subtract fractions with different denominators, we must first obtain a common denominator.

Example 2: Simplify each of the following problems.

(a) $\frac{5}{12} - \frac{1}{20} =$

(b) $\frac{7}{20} - \frac{3}{28} =$

(c) $10\frac{1}{6} - 3\frac{2}{3} =$

(d) $4\frac{2}{5} - 2\frac{2}{3} =$