Addition of Fractions

Key Concepts:

- Fractions represent parts of a whole.
- Addition of fractions depends on whether the denominators (bottom numbers) are the same or different.

Case 1: Like Fractions (Same Denominator)

When the denominators are the same, just add the numerators and keep the denominator as it is.

Formula:

If $\frac{a}{b}$ and $\frac{c}{b}$ are like fractions,

then
$$\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b}$$

Example 1:

Add: $\frac{3}{8} + \frac{2}{8}$

Add: $\frac{7}{11} + \frac{1}{11}$

Example 2:

Solution:

Solution:

 $=\frac{7+1}{11}=\frac{8}{11}$

Since denominators are same,

 $\frac{3}{8} + \frac{2}{8} = \frac{3+2}{8} = \frac{5}{8}$

Case 2: Unlike Fractions (Different Denominators)

Steps:

- i. Find the LCM of the denominators.
- ii. Convert each fraction to an equivalent fraction with the LCM as denominator.
- iii. Add the numerators.

Example 1:

ample 1:	Example 2:
Add: $\frac{2}{5} + \frac{3}{10}$	Add: $\frac{1}{3} + \frac{2}{7}$
Solution:	Solution:
LCM of 5 and 10 = 10	LCM of 3 and 7 = 21
Convert $\frac{2}{5} = \frac{2 \times 2}{5 \times 2} = \frac{4}{10}$	$\frac{1}{3} = \frac{7}{21}, \frac{2}{7} = \frac{6}{21}$
Now, $\frac{4}{10} + \frac{3}{10} = \frac{4+3}{10} = \frac{7}{10}$	Now, $\frac{7}{21} + \frac{6}{21} = \frac{7+6}{21} = \frac{13}{21}$

Properties of Addition of Fractions:

• Closure Property: The sum of any two fractions is also a fraction.

Example: $\frac{1}{2} + \frac{1}{3} = \frac{5}{6}$ (a fraction)

• **Commutative Property:** Changing the order doesn't change the sum.

 $\frac{a}{b} + \frac{c}{d} = \frac{c}{d} + \frac{a}{b}$ Example: $\frac{1}{4} + \frac{2}{3} = \frac{2}{3} + \frac{1}{4}$

• Associative Property: $\left(\frac{a}{b} + \frac{c}{d}\right) + \frac{e}{f} = \frac{a}{b} + \left(\frac{c}{d} + \frac{e}{f}\right)$

(Only works if all are added correctly with common denominators)