Operations with Fractions

1. Adding like fractions

In case of like fractions, the denominator is same so we can add them easily.

Steps to add like fractions-

a. Add the numerators.

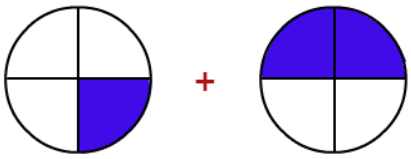
b. Leave the common denominator same. (Don't add the denominator).

c. Write the answer as

$$\frac{\text{Numerator 1} + \text{Numerator 2}}{\text{Common Denominator}}$$

Example

Add $\frac{1}{4} + \frac{2}{4}$.



$\frac{1}{4}$ + $\frac{2}{4}$

Solution

$$\frac{1}{4} + \frac{2}{4} = \frac{1+2}{4} = \frac{3}{4}$$

2. Subtracting like fractions

Steps to subtract the like fractions-

a. Subtract the small numerator from the bigger one.

b. Leave the common denominator same.

c. Write the answer as

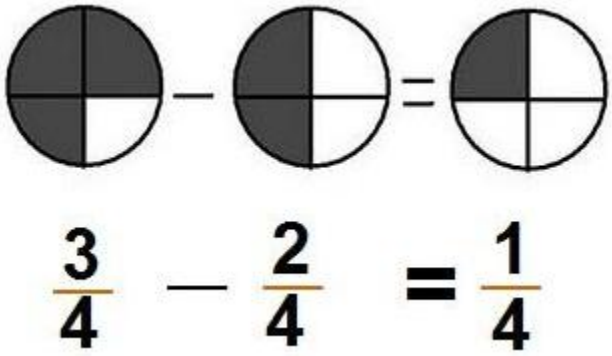
$$\frac{\text{Big numerator} - \text{small numerator}}{\text{common denominator}}$$

Example

Subtract $\frac{2}{4}$ from $\frac{3}{4}$.

Solution

$$\frac{3}{4}-\frac{2}{4}=\frac{(3-2)}{4}=\frac{1}{4}$$



$$\frac{3}{4} - \frac{2}{4} = \frac{1}{4}$$

3. Adding unlike fraction

If we have to add the unlike fractions, first we have to find the equivalent fraction of the given fractions with the same denominator then add them.

Steps to add unlike fractions-

a. Take the LCM of the denominator of the given fractions.

b. Find the equivalent fractions of both fractions with LCM as the denominator.

c. Add them as the like fractions.

Example

Find $\frac{4}{5}+\frac{3}{8}$.

Solution

Take the LCM of 5 and 8, which is 40.

$$\frac{4}{5}\times\frac{8}{8}=\frac{32}{40}$$

$$\frac{3}{8}\times\frac{5}{5}=\frac{15}{40}$$

$$\frac{32}{40}+\frac{15}{40}=\frac{47}{40}=1\frac{7}{40}$$

4. Subtracting unlike fractions

Steps to subtract unlike fractions-

a. Take the LCM of the denominator of the given fractions.

b. Find the equivalent fractions of both fractions with LCM as the denominator.

c. Subtract them as the like fractions.

Example

$\text{Find}\,\frac{3}{4}-\frac{1}{5}.$

Solution

LCM of 4 and 5 is 20.

$\frac{3}{4}\times\frac{5}{5}=\frac{15}{20}$

$\frac{1}{5}\times\frac{4}{4}=\frac{4}{20}$

$\frac{15}{20}-\frac{4}{20}=\frac{11}{20}$

Mixed operations

Revision Notes on Mixed operations

Fractions tell about **"a part of a whole"**.

Here the pizza is divided into 4 equal parts and there are 3 parts left with us.

We will write it in a fraction as 3/4, in which 3 is numerator which tells the number of parts we have and 4 is denominator which tells the total parts in a whole.

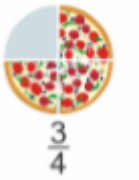
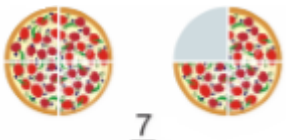
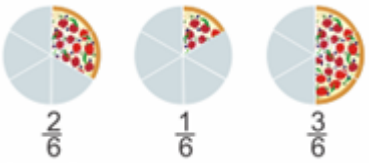
The General form of a Fraction

$$\text{Fraction} = \frac{\text{Numerator}}{\text{Denominator}}$$

Where, denominator ≠ 0

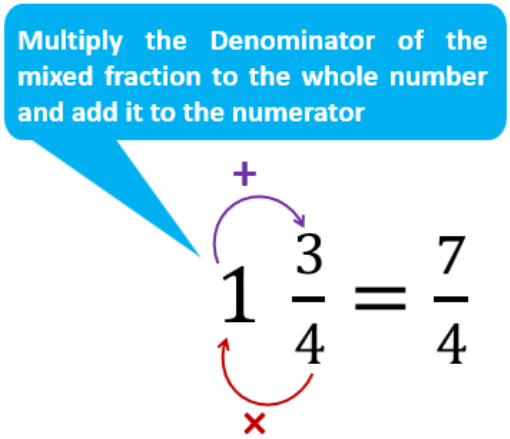
If numerator = denominator then the fraction becomes a whole i.e. 1. This is called unity of fraction.

Types of Fraction

Type of Fraction	Meaning	Example
Proper fraction	When numerator is less than the denominator. It shows the part of a whole.	 $\frac{3}{4}$
Improper fraction	When numerator is more than the denominator. It represents the mixture of whole and a proper fraction.	 $\frac{7}{4}$
Mixed Fraction	The improper fraction can be written in the mixed form as it is the mixture of whole number and a fraction.	 $1\frac{3}{4}$
Like Fraction	The fractions with the same denominator are like fractions.	 $\frac{2}{6}$ $\frac{1}{6}$ $\frac{3}{6}$
Unlike Fraction	The fractions with different denominators are unlike fractions.	 $\frac{1}{2} = \frac{2}{4} = \frac{3}{6}$
Equivalent Fraction	The fractions proportional to each other are called equivalent fractions. It	 $\frac{1}{2}$ $\frac{2}{3}$ $\frac{3}{4}$

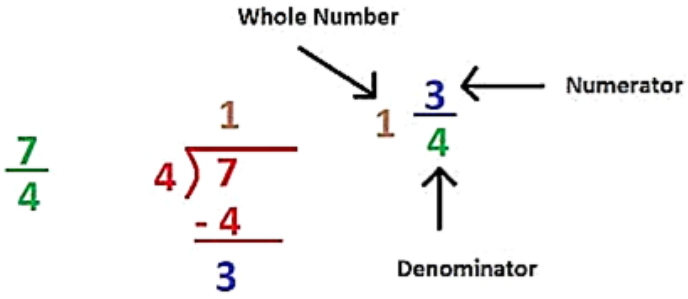
	represents the same amount with different fractions.

Converting a Mixed Fraction into an Improper Fraction



Converting an Improper Fraction into a Mixed Fraction

Divide the Numerator by the denominators that the quotient will be the whole number and remainder will be the numerator, while denominator will remain the same.

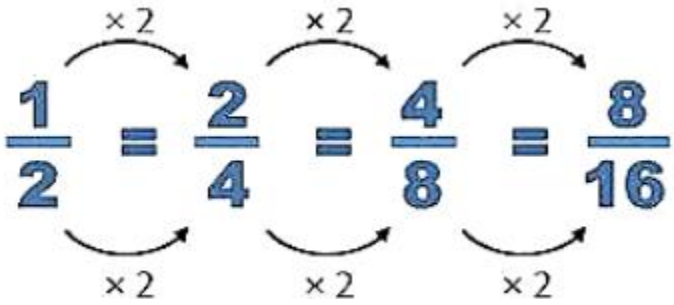


$$\text{Mixed Fraction} = \text{Quotient}\frac{\text{Remainder}}{\text{Divisor}}$$

How to find the equivalent fractions?

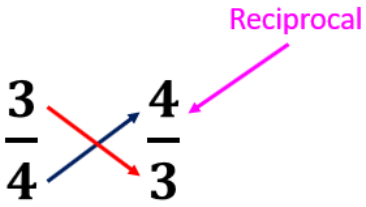
To find the equivalent fraction of proper and improper fraction, we have the multiply both the numerator and denominator with the same number.

Example



Reciprocal of a Fraction

If we have two non-zero numbers whose product is one then these numbers must be the reciprocals of each other.



To find the reciprocal of any fraction, we just need to flip the numerator with the denominator.

Multiplication of Fractions

1. How to multiply a fraction with a whole number?

a. If we have to multiply the **proper or improper fraction with the whole number** then we simply multiply the numerator with that whole number and the denominator will remain the same.

Example

$$2 \times \frac{3}{4} = \frac{6}{4}$$

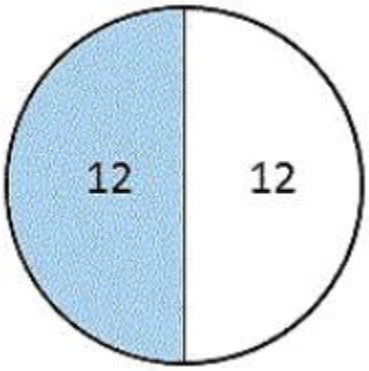
b. If we have to multiply the **mixed fraction with the whole number** then first convert it in the form of improper fraction then multiply as above.

Example

$$2\frac{3}{5} \times 2 = \frac{13}{5} \times 2 = \frac{26}{5}$$

c. Fraction as an operator "of".

If it is written that find the 1/2 of 24 then what does 'of' means here?



Here ‘of’ represents the multiplication.

$$\frac{1}{2}\text{ of } 24 = \frac{1}{2} \times 24 = 12$$

2. How to multiply a fraction with another fraction?

If we have to multiply the **proper or improper fraction with another fraction** then we simply multiply the numerator of both the fractions and the denominator of both the fractions separately and write them as the new fraction.

$$\text{Fraction} \times \text{Fraction} = \frac{\text{Product of Numerators}}{\text{Product Of Denominators}}$$

$$\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$$

Example

a. $\frac{2}{5} \times \frac{3}{4} = \frac{2 \times 3}{5 \times 4} = \frac{6}{20}$

b. $\frac{1}{2}\text{of}\frac{9}{4} = \frac{1}{2} \times \frac{9}{4} = \frac{9}{8}$

Value of the products of the fractions

Generally when we multiply two numbers then we got the result which is greater than the numbers.

5 × 6 = 30, where, 30 > 5 and 30 > 6

But in case of a fraction, it is not always like that.

a. The product of two proper fractions

If we multiply two proper fractions then their product will be less than the given fractions.

Example

$$\frac{2}{5}\times\frac{4}{9}=\frac{8}{45}\text{ where, }\frac{8}{45}<\frac{2}{5}\text{ and }\frac{8}{45}<\frac{4}{9}$$

b. The product of two improper fractions

If we multiply two improper fractions then their product will be greater than the given fractions.

Example

$$\frac{9}{2}\times\frac{7}{4}=\frac{63}{8},\text{where }\frac{63}{8}>\frac{9}{2}\text{ and }\frac{63}{8}>\frac{7}{4}$$

c. The product of one proper and one improper fraction

If we multiply proper fraction with the improper fraction then the product will be less than the improper fraction and greater than the proper fraction.

Example

$$\frac{2}{5}\times\frac{7}{3}=\frac{14}{15},\text{where }\frac{14}{15}>\frac{2}{5}\text{ and }\frac{14}{15}<\frac{7}{3}$$

Division of Fractions

1. How to divide a whole number by a Fraction?

a. If we have to divide the **whole number with the proper or improper fraction** then we will multiply that whole number with the reciprocal of the given fraction.

Example

$$2\div\frac{9}{5}=2\times\frac{5}{9}=\frac{10}{9}$$

b. If we have to divide the **whole number with the mixed fraction** then we will convert it into improper fraction then multiply it's reciprocal with the whole number.

Example

$$2\div1\frac{4}{5}=2\div\frac{9}{5}=2\times\frac{5}{9}=\frac{10}{9}$$

2. How to divide a Fraction with a whole number?

To divide the fraction with a whole number, we have to take the reciprocal of the whole number then divide it with the whole number as usual

Example

$$\frac{3}{10} \div 2 = \frac{3}{10} \div \frac{2}{1} = \frac{3}{10} \times \frac{1}{2} = \frac{3}{20}$$

3. How to divide a fraction with another Fraction?

To divide a fraction with another fraction, we have to multiply the first fraction with the reciprocal of the second fraction.

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

Example

Invert the fraction that you are dividing by

$$\frac{4}{5} \div \frac{2}{3} = \frac{4}{5} \times \frac{3}{2}$$

Multiply the numerators and denominators

$$\frac{4}{5} \times \frac{3}{2} = \frac{12}{10}$$

Simplify the fraction if necessary

$$\frac{12}{10} = 1\frac{1}{5}$$