

# Fractions - An Introduction

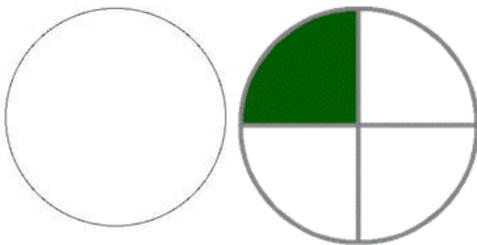
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## What is a Fraction?



We define [fraction](#) as a part of a whole number or fractions are for counting part of something. For example, we have a pizza which is to be shared among 4 friends so what is the share for each friend?

Below figures represent pizza and the share for one person respectively.



## Types of fractions

- [Proper fractions](#)
- [Improper fractions](#)
- [Mixed fractions](#)

**Proper Fraction** – A fraction, whose numerator is less than the denominator is called Proper Fraction.  
For example –  $7/9$ ,  $3/11$

**Improper Fraction** – A fraction whose numerator is greater than the denominator is called Improper Fraction.  
For example –  $17/5$ ,  $47/31$

**Mixed Fraction** - A combination of a whole number and a proper fraction is called a Mixed Fraction.  
For example –  $2 \frac{3}{5}$ ,  $7 \frac{4}{15}$

# Conversion between Improper and Mixed fractions

In order to convert a mixed fraction into an improper fraction, we may use the following formula:

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

$$\text{For example } - 3 \frac{2}{5} = \frac{3 \times 5 + 2}{5} = \frac{15 + 2}{5} = \frac{17}{5}$$

Now, to express an improper fraction as a mixed fraction, we first divide the numerator by denominator and calculate the quotient and remainder and then we write the mixed fraction as

$$\frac{\text{Remainder}}{\text{Quotient}} \frac{\text{Denominator}}$$

$$\text{For example } - \frac{19}{4} = 4 \frac{3}{4} \quad [\text{Quotient} = 4, \text{Remainder} = 3]$$

## Fractions – Standard Form

### Types of fractions used in reducing fractions to their lowest or standard form

**Equivalent Fractions** – A given fraction and various fractions obtained by multiplying (or dividing) its numerator and denominator by the same non – zero number, are called [Equivalent fractions](#).

$$\text{For example } - \frac{3}{4} \times 2 = \frac{6}{8}, \quad \frac{3}{4} \times 3 = \frac{9}{12}, \quad \frac{3}{4} \times 4 = \frac{12}{16}$$

**Like Fractions** – Fractions having the same denominators are called [like fractions](#).

$$\text{For example } - \frac{2}{15}, \frac{7}{15}$$

**Unlike Fractions** – Fractions with different denominators are called [unlike fractions](#)

$$\text{For example } - \frac{2}{13}, \frac{7}{24}$$

### How to write fraction in its standard form

**Fraction In Lowest Terms** – A fraction is in its lowest terms if its numerator and denominator have no common factor other than 1.

For example - Reduce  $\frac{144}{180}$

180

First we find the HCF of 144 and 180 by factorization method.

The factors of 144 are: 1,2,3,4,6,8,9,12,16,18,24,36,48,72 and 144

The factors of 180 are: 1,2,3,4,5,6,10,12,15,18,30,36,45,60,90 and 180

The common factors of 144 and 180 are: 1, 2, 3,4,6,12,18 and 36

So, HCF of 144 and 180 is 36.

Dividing numerator and denominator by the HCF of 144 and 180 i.e., 36

Now,  $\frac{144}{180} = \frac{144 \div 36}{180 \div 36} = \frac{4}{5}$

## Comparing Fractions

**Comparing Fractions** – In order to [compare fractions](#), we may use the following steps:

- Find the LCM of the denominators of the given fractions.
- Convert each fraction to its equivalent fraction with denominator equal to the LCM obtained in step 1.
- Arrange the fractions in ascending or descending order by arranging numerators in ascending or descending order.

For example, which is larger  $\frac{3}{4}$  or  $\frac{5}{12}$ ?

Let us first find the LCM of 4 and 12.

We have,

$\frac{2}{2} \times \frac{4}{3} = \frac{8}{6}$

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

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

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

LCM of 4 and 12 is  $2 \times 2 \times 3 = 12$

Now we convert the given fractions to equivalent fractions with denominator 12.

$\frac{3}{4} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$

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

We know that  $9 > 5$

$\frac{9}{12} > \frac{5}{12}$

$\frac{3}{4} > \frac{5}{12}$

## Conversion of unlike fractions to like fractions

To convert unlike fractions to like fractions we follow the following steps:

- Find the LCM of the denominators of the given fractions.
- Convert each of the given fractions into an equivalent fraction having denominator equal to the LCM obtained in previous step.

For example – Convert the unlike fractions  $\frac{7}{6}$ ,  $\frac{5}{9}$  and  $\frac{5}{12}$  into like fractions.

We have, LCM (6, 9, 12) =  $(3 \times 2 \times 3 \times 2) = 36$

Now,  $\frac{7}{6} = \frac{7 \times 6}{6 \times 6} = \frac{42}{36}$ ;  $\frac{5}{9} = \frac{5 \times 4}{9 \times 4} = \frac{20}{36}$ ;  $\frac{5}{12} = \frac{5 \times 3}{12 \times 3} = \frac{15}{36}$

Clearly,  $\frac{42}{36}$ ,  $\frac{20}{36}$  and  $\frac{15}{36}$  are like fractions.

Now try it yourself! Should you still need any help, [click here](#) to schedule live online session with e Tutor!

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## Reference Links:

- [http://en.wikipedia.org/wiki/Fraction\\_\(mathematics\)](http://en.wikipedia.org/wiki/Fraction_(mathematics))
- <http://www.thefreedictionary.com/proper+fraction>
- [http://wiki.answers.com/Q/What\\_is\\_an\\_improper\\_fraction](http://wiki.answers.com/Q/What_is_an_improper_fraction)
- [http://en.wikipedia.org/wiki/Fraction\\_\(mathematics\)#Mixed\\_numbers](http://en.wikipedia.org/wiki/Fraction_(mathematics)#Mixed_numbers)
- <http://www.aaaknow.com/fra42ax2.htm>
- <http://math.about.com/library/bl1.htm>
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