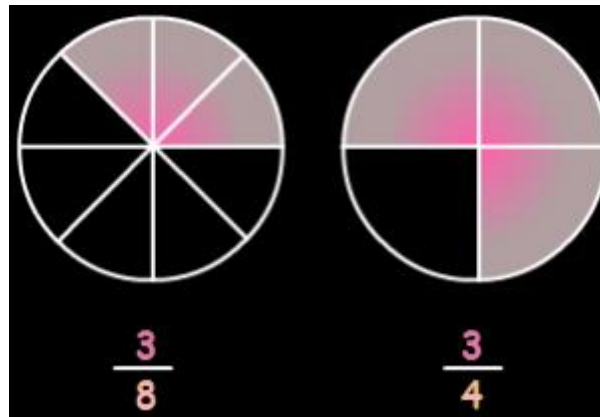


# HANDOUT- 3 /4 -FRACTIONS

## Unlike Fractions

Fractions with different denominators are called, **unlike fractions**. Here the denominators of fractions have different values. For example,  $\frac{2}{3}$ ,  $\frac{4}{9}$ ,  $\frac{6}{67}$ ,  $\frac{9}{89}$  are unlike fractions.



Unlike Fractions

Since the denominators here are different, therefore it is not easy to add or subtract such fractions. To perform arithmetic operations like addition and subtraction in case of unlike fractions, we have to convert the unlike fractions into like fractions first. Then we perform the required operation.

## Like Fractions

They are the group of two or more fractions that have exactly the same denominator. Or we can say that the fractions which have the same numbers at the bottom or in the denominators are called like fractions. For example,  $\frac{1}{7}$ ,  $\frac{2}{7}$ ,  $\frac{5}{7}$ ,  $\frac{6}{7}$  all like fractions, whose denominators equal to 7.



It is easy to perform arithmetic operations such as addition and subtraction on like fractions. We don't have to neutralise the denominators while performing both the operations. Let us understand with the help of examples.

## Conversion of Unlike to Like Fraction

Like fractions facilitate the comparison of fractions. So there is often a need to convert unlike fractions to them.

Let us convert  $\frac{1}{4}$ ,  $\frac{4}{5}$ ,  $\frac{7}{10}$  and  $\frac{1}{2}$  into like fractions. Steps for conversion:

- Find the LCM of the denominators. LCM of 1, 5, 10 and 2 is 10.
- Calculate their equivalent fractions with the same denominator, that is, the LCM.

$$1/1 = (1 \times 10)/(1 \times 10) = 10/10$$

$$4/5 = (4 \times 2)/(5 \times 2) = 8/10$$

$$7/10 = (7 \times 1)/(10 \times 1) = 7/10$$

$$1/2 = (1 \times 5)/(2 \times 5) = 5/10$$

1, 4/5, 7/10 and 1/2 which are unlike fractions can be represented as 10/10, 8/10, 7/10 and 5/10 which are like fractions.

It is to be noted that when the denominators become equal, the fractions can be compared. You would not be able to answer the largest among 1, 4/5, 7/10 and 1/2. But once they have been converted to 10/10, 8/10, 7/10 and 5/10, you can arrange them in the ascending order of 5/10, 7/10, 8/10 and 10/10 very conveniently.

Sometimes, math problems do not use numbers or even words to express parts of the equation. The math problem may contain a symbol, a special shape that replaces words.

<	less than
>	greater than
=	equal to

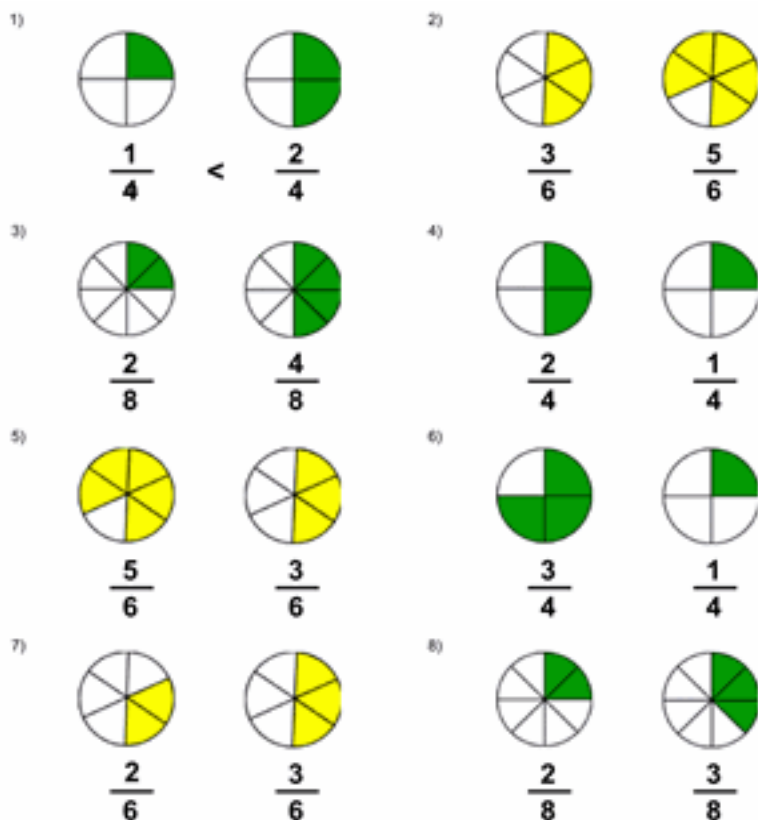
## Comparing Like Fractions

Now, let's compare **like fractions**, which are two or more fractions in which the denominators (bottom numbers) are the same, which tells us they each represent a whole that is divided into the same number of parts. For instance, 3/8 and 5/8 are like fractions.

$\begin{array}{ccc} 3 & & 5 \\ - & < & - \\ 8 & & 8 \end{array}$	<ul style="list-style-type: none"> <li>• Check for matching denominators.</li> <li>• Compare the numerators.</li> <li>• Choose the correct symbol.</li> </ul>
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*As you can see here, 3/8 has a smaller numerator than 5/8, so we use the less-than symbol in between.*

### Comparison of like fractions :



## Comparing Unlike Fraction

In comparing unlike fractions, we first convert them into like fractions by using the following steps and then compare them.

### Step I:

*Obtain the denominators of the fractions and find their LCM (least common multiple).*

### Step II:

*Each fractions are converted to its equivalent fraction with denominator equal to the LCM (least common multiple) obtained in Step I.*

**Step III:** *Compare the numerators of the equivalent fractions whose denominators are same.*

### Examples on Comparing Unlike Fractions:

1. Which is larger  $\frac{3}{4}$  or  $\frac{5}{12}$  ?

**Solution:**

Let us first find the LCM (least common multiple) of the denominators 4 and 12.

We have,

$$\begin{array}{r|l} 2 & 4, 12 \\ \hline 2 & 2, 6 \\ \hline 3 & 1, 3 \\ \hline & 1, 1 \end{array}$$

Therefore, LCM (least common multiple) of 4 and 12 is  $2 \times 2 \times 3 = 12$ .

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

We have,

$$\frac{3}{4} = (3 \times 3)/(4 \times 3) = 9/12$$
$$\frac{5}{12} = (5 \times 1)/(12 \times 1) = 5/12$$

Now we will observe the numerator, that is  $9 > 5$ .

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

Therefore,  $\frac{3}{4} < \frac{5}{12}$

2.

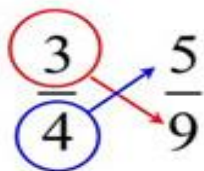
Compare  $\frac{3}{4}$  &  $\frac{2}{3}$

The LCM of 3 and 4 is 12

$$\frac{3 \times 3}{4 \times 3} = \frac{9}{12} \quad \frac{2 \times 4}{3 \times 4} = \frac{8}{12}$$
$$\frac{9}{12} > \frac{8}{12}$$

3.

Compare  $\frac{3}{4}$  to  $\frac{5}{9}$ .



$\frac{3}{4}$  is to  $\frac{5}{9}$  as  $3 \times 9$  is to  $4 \times 5$

$$\frac{27}{4} > \frac{20}{9}$$

In this comparison,  
 $\frac{3}{4}$  is the larger fraction  
since  $27 > 20$ .

**Like fractions in ascending order & descending order**

(a) Respective fractions as shown by the figures are  $\frac{3}{8}$ ,  $\frac{6}{8}$ ,  $\frac{4}{8}$  and  $\frac{1}{8}$ .

Their ascending order:

$$\frac{1}{8} < \frac{3}{8} < \frac{4}{8} < \frac{6}{8}$$

Descending order:

$$\frac{6}{8} > \frac{4}{8} > \frac{3}{8} > \frac{1}{8}$$

(b) Respective fractions as shown by the figures are  $\frac{8}{9}$ ,  $\frac{4}{9}$ ,  $\frac{3}{9}$  and  $\frac{6}{9}$ .

Their ascending order:

$$\frac{3}{9} < \frac{4}{9} < \frac{6}{9} < \frac{8}{9}$$

Descending order:

$$\frac{8}{9} > \frac{6}{9} > \frac{4}{9} > \frac{3}{9}$$

### Unlike fractions in ascending order

1. write the below given fractions in ascending order

The given fractions are  $\frac{5}{6}$ ,  $\frac{7}{8}$ ,  $\frac{5}{9}$ .

LCM of 6, 8 and 9 = 72

$$\frac{5}{6} \times \frac{5 \times 12}{6 \times 12} = \frac{60}{72}$$

$$\frac{7}{8} = \frac{7 \times 9}{8 \times 9} = \frac{63}{72}$$

$$\frac{5}{9} = \frac{5 \times 8}{9 \times 8} = \frac{40}{72}$$

Since  $40 < 60 < 63$ ,  $\frac{40}{72} < \frac{60}{72} < \frac{63}{72}$

$$\therefore \frac{5}{9} < \frac{5}{6} < \frac{7}{8}$$

2. Arrange  $\frac{2}{5}$ ,  $\frac{4}{6}$ ,  $\frac{1}{3}$ ,  $\frac{3}{5}$  ascending order

$$\frac{2}{5} \times \frac{6}{6} = \frac{12}{30} \quad \frac{4}{6} \times \frac{5}{5} = \frac{20}{30} \quad \frac{3}{5} \times \frac{6}{6} = \frac{18}{30} \quad \frac{1}{3} \times \frac{10}{10} = \frac{10}{30}$$

The equivalent fractions are:

$$\frac{12}{30}, \frac{20}{30}, \frac{18}{30} \text{ and } \frac{10}{30}$$

On comparing, we get:

$$\frac{10}{30} < \frac{12}{30} < \frac{18}{30} < \frac{20}{30}$$

Therefore,

$$\frac{1}{3} < \frac{2}{5} < \frac{3}{5} < \frac{4}{6}$$

**Arrange the below given fractions in descending order**

$$(ii) \frac{3}{7}, \frac{4}{9}, \frac{5}{7}, \frac{8}{11}$$

$$= \frac{3 \times 40}{7 \times 40}, \frac{4 \times 30}{9 \times 30}, \frac{5 \times 24}{7 \times 24}, \frac{8 \times 15}{11 \times 15}$$

$$= \frac{120}{280}, \frac{120}{270}, \frac{120}{168}, \frac{120}{165}$$

$$\text{Clearly, } \frac{120}{165} > \frac{120}{168} > \frac{120}{270} > \frac{120}{280}$$

$$\text{Hence, } \frac{8}{11}, \frac{5}{7}, \frac{4}{9}, \frac{3}{7}$$

### **Word problems on fractions**

1 . Robert ate  $\frac{9}{22}$  part of the pizza and Maria ate  $\frac{5}{11}$  part of the pizza. Who ate the greater part of the pizza? What fraction of pizza was finished by the two girls?

**Solution:**

Robert ate  $\frac{9}{22}$  part of the pizza.

Maria ate  $\frac{5}{11}$  part of the pizza.

Let us first convert both fractions to like fractions and then compare.

Let us find the LCM of the denominators 22 and 11.

The LCM of 22 and 11 is 22.

$$\frac{9}{22} = \frac{9 \times 1}{22 \times 1} = \frac{9}{22}$$

$$\frac{5}{11} = \frac{5 \times 2}{11 \times 2} = \frac{10}{22}$$

Compare the two fractions  $\frac{9}{22}$  and  $\frac{10}{22}$ .

Here  $10 > 9$ . Thus,  $\frac{5}{11} > \frac{9}{22}$ .

Maria ate the greater part of the pizza.

2 . Ila read 25 pages of a book containing 100 pages . Valli read  $\frac{2}{5}$  of the same book.. Who read less ?

$$\text{Sol : The part of the book read by Ila} = \frac{25}{100} = \frac{25 \times 1}{25 \times 4} = \frac{1}{4}$$

now let us compare  $\frac{1}{4}$  &  $\frac{2}{5}$

LCM of 4 & 5 is  $4 \times 5 = 20$  ,

$$\frac{1 \times 5}{4 \times 5} = \frac{5}{20} \quad ; \quad \frac{2 \times 4}{5 \times 4} = \frac{8}{20}$$

$$\frac{5}{20} < \frac{8}{20}$$

Therefore Ila read less than Valli

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