Lesson - 7

Fraction

V1A2H1

Revisiting the concept of fractions

One sunday afternoon :

One sunday afternoon Parinita and Kavyeshree were playing at Parinita's house. During that time Parinita's mother served a dew pieces of apples on a plate and asked them to help themselves. She asked them to have two piece each. Both of them observed that the apple was equally divided into 4 pieces and kept on the plate. Both of them took two pieces each from the plate. During this process they thought that, if the whole apple would be divided into two pieces equally, then also they would have had half of an apple each. And that half of an apple is equal to the two pieces out of four pieces. That means, if an apple is divided into 4 equal parts, then each part is equal to the $\frac{1}{4}$ part of the apple. And if it is divided into 2 equal parts, then each part is equal to $\frac{1}{2}$ of the apple. Still 2 pieces each of $\frac{1}{4}$ part of the apple equals to half of the apple.

one apple

$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$

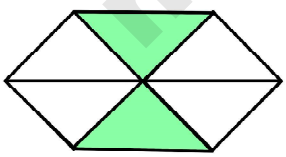
4 equal piece of an apple

$\frac{1}{2}$ $\frac{1}{2}$

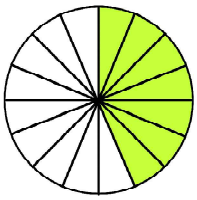
2 equal pieces of an apple

Let us observe the pictures they draw

Pictures drawn by Parinita

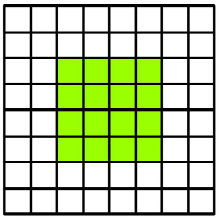


2 parts out of 6 are coloured. So, to show the coloured parts we can write $\frac{2}{6}$. Here, 2 is numerator and 6 is denominator.



7 parts out of 16 are coloured. So, to show the coloured parts we can write $\frac{7}{16}$. Here, 7 is numerator and 16 is denominator.

Picture drawn by Kavyashree



16 parts out of 64 are coloured. So, to show the coloured part we can write $\frac{16}{64}$.
Here, 16 is numerator and 64 is denominator.

5 parts out of 8 are coloured. So, to show the coloured part we can write $\frac{5}{8}$
Here, 5 is numerator and 8 is denominator.

They have learnt from the pictures they have drawn that, a fraction is a number representing part of a whole. The whole may be a single object or a group of objects.

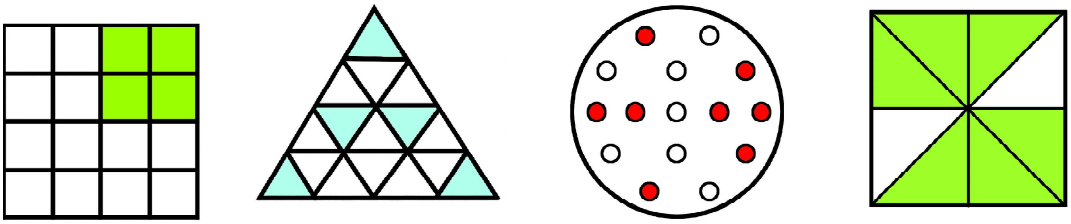
Suppose $\frac{4}{9}$ is a fraction, we read it as 'four ninths'. Here '9' stands for the number of equal parts into which the whole has been divided. 4 stands for the number of equal parts which have been taken out.

We find application of fractions in our day to day life activities for example the way in which we divide something to eat equally between two persons, how much quantity of milk from the total quantity is given by your mother to you and your sister to drink, if you read a few pages of a book then how many pages out of the total pages did you read, moreover how many parts of the land for your garden has been used for spinach cultivation- all these can be explained in terms of fraction.

Do it yourself

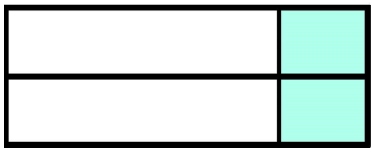
1. Write the fraction representing the shaded portion.

(i) (ii) (iii) (iv)



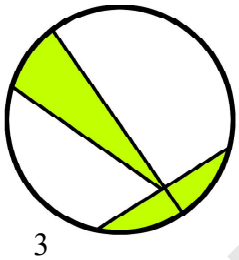
2. Write whether the fraction identifying the shaded portion is correct or not.

(i)



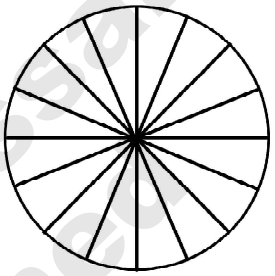
$\frac{2}{4}$

(ii)

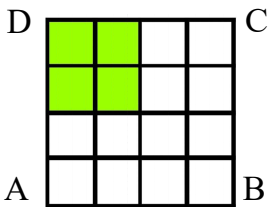


$\frac{3}{5}$

3. Shade 7 parts of the adjacent ring. Write the fraction representing the shaded portion.



4. Write the natural numbers from 1 to 50. Encircle the prime numbers from them. What fraction of the natural numbers are prime numbers, express them.
5. What fraction of a year is 5 months.
6. What fraction of a metre is 25 cm.
7. Write the natural numbers from 1 to 100. What fraction of them are squared number?
8. Length (side) of a squared piece of land is 30 metres. A brick wall is constructed surrounding by this piece of land but a length of 10 metre is left on one side to build an iron gate. What fraction of the perimeter of the land is left without wall?
9. A and B are two places connected by a road of length 25 km. 9 km of the road is pitched. What fraction of the road is pitched and what fraction is not pitched?
10. In the adjacent figure $\overline{AB} = \overline{BC} = \overline{CD} = \overline{DA} =$ 8cm Length of the side of each small square inside it is 2cm. What fraction of the area of the big square is the area of the shaded part?

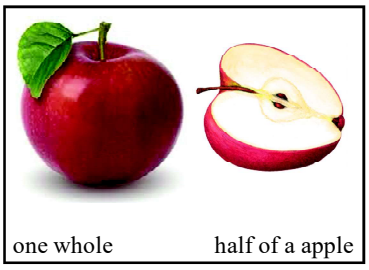


Proper fraction, Improper fraction and Mixed fraction

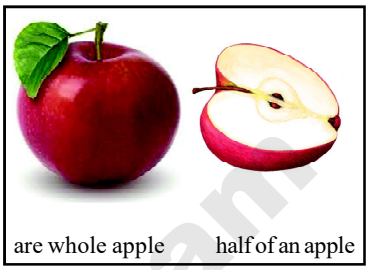
Suppose, an apple is to be distributed equally among 3 students. Then the apple has to be divided into 3 equal parts and distribute one part each to all three of them. So, each one received $\frac{1}{3}$ of the apple. Here, $\frac{1}{3}$ is a fraction. The numeretor and denominator is 1 and 3 respectively. That means, numerator, is less than the denominator. Consider another example suppose 3 apples are to be shared between 2 girls equally.

Let us observe, how this is done.

Out of 3 apples, 2 apples are shared among both the girls by giving them an apple each. The third apple is divided into two parts and shared by giving half of an apple to each of them. In this way each one will get one full apple and a half of the third apple.



First girl



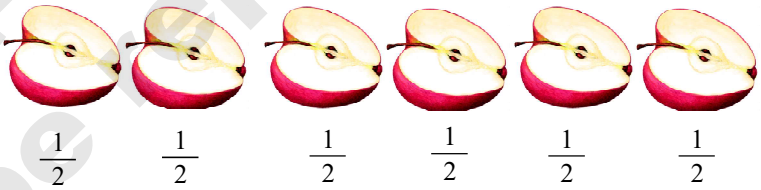
Second girl

Hence, the portion of the first girl is $(1+\frac{1}{2})$ of the apple and that of the second girl is $(1+\frac{1}{2})$ of the apple. Remember that, to unite one object with another one, we use addition. This can be done by another other way also.

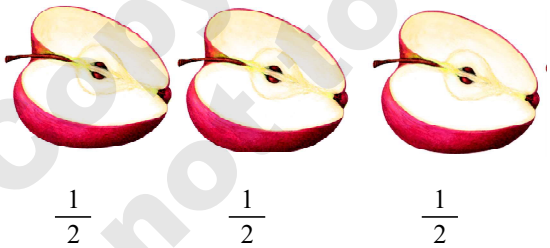
Suppose, each of the three apples are divided into two equal parts. Then we get total six parts of the apples. From these 6 parts (each part is $\frac{1}{2}$ the apple) share three parts each among both the girls.

The exercise is shown below.

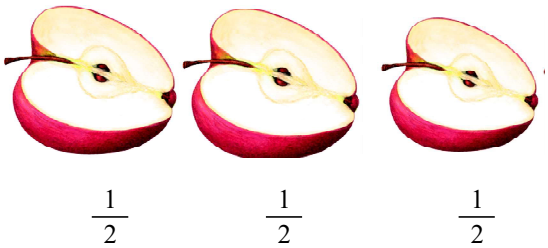
3 whole apples



6 parts (each part $\frac{1}{2}$ of an apple)



share of the first girl



share of the second girl

That means each girl received $(\frac{1}{2}+\frac{1}{2}+\frac{1}{2})$ of the apples.

Though the task is done in two different ways, in both the ways of sharing among both the girls would be equal.

Remember that, when one apple is shared among three students, then each of them gets $\frac{1}{3}$ of the apple. In this case the numerator was less than the denominator. Suppose an object is divided into 10 equal parts and 7 parts among them are considered than that will be expressed as $\frac{7}{10}$. Then also the numerator is less than the denominator. The fractions of this type $\frac{1}{3}$ or $\frac{7}{10}$ is called a proper fraction.

The fractions, in which the numerator is less than the denominetor are called proper fractions. For example $\frac{1}{3}, \frac{7}{10}, \frac{11}{15}, \frac{5}{6}$ etc are proper fractions.

Earlier we shared 3 apples between two girls, Then the value of the share of each girl can be written as $3 \div 2$ or $\frac{3}{2}$. That means, $1+\frac{1}{2}$ or $\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$ both can be written as $\frac{3}{2}$. In this case i.e. in $\frac{3}{2}$ numerator is 3 which is bigger than the denominator 2.

These fractions, where the numerator is bigger than the denominator are called improper fractions. Thus, fractions like $\frac{3}{2}, \frac{11}{7}, \frac{15}{4}, \frac{25}{11}$ are all improper fractions.

Again remember the fact of sharing 3 apples among 2 girls.

In the first process, each girl got 1 full apple and $\frac{1}{2}$ of an apples. We write it as $(1+\frac{1}{2})$. In this one is full and the other is part. That means, it is a conbination of a whole and a part. Hence, it is called a mixed fraction.

The fraction, which are combination of a whole and a part are called mixed fractions $3\frac{2}{5}, 2\frac{1}{3}$.

Do it yourself

1. Write the proper fractions whose-
   (a) Denominator is 11 and numerator 7 (b) Numerator is an even prime number and denominator is 3 more than that.
2. (a) Write a proper fraction whose, sum of denominator and numerator is 9. Is there any more proper fraction satisfying this condition? Match the fractions which you got, with the fractions, which your class mate found out.
   (b) Write a proper fraction, whose numerator is 3 less than the denominator. Can you write 5 more fractions of this type? Can you think, how many such fraction are there?

3. Write a fraction whose numerator is 7 more than the denominator. Is it proper or improper fraction? Can you write 5 more fractions of this type?
4. How can you share 5 apples among 3 students? Express the quantity received by each student in mixed fraction.
5. How can you share 7 apples among 2 girls, (Use both the ways used earlier)

Conversion of Improper fraction to Mixed Fraction

Example 1: Express the improper fraction $\frac{10}{3}$ as mixed fraction.

Solution : Suppose, 10 fruits are to be shared among 3 students. You know that one of the multiples of 3 is 9, So, 9 fruits can be shared among 3 students by giving there 3 fruits each. So, everyone gets 3 fruits each. After that the remaining one, that is 10th fruit is to be shared among each of them by dividing it into three equal parts. Hence each student will get $(3+\frac{1}{3})$ of the fruits. It can be written as $3\frac{1}{3}$. So, $\frac{10}{3}$ and $3\frac{1}{3}$ are same. This can also be done by any one of the following two methods.

Method 1: $\frac{10}{3}$ means 10 is to be divided by 3.

So, $\frac{10}{3}=3\frac{1}{3}$

$$\begin{array}{r|l} & 3 \\ 3 & 10 \\ & -\ 9 \\ \hline & 1 \end{array}$$

So, $10\div 3=3\frac{1}{3}$

Method 2: $\frac{10}{3}=\frac{9+1}{3}=\frac{9}{3}+\frac{1}{3}=3+\frac{1}{3}=3\frac{1}{3}$

So, the mixed fraction of $\frac{10}{3}$ is $3\frac{1}{3}$.

Example : Convert $\frac{37}{4}$ to mixed fraction

Solution : 37is to be divided by 4.

So,

$$\begin{array}{r|l} & 9 \\ 4 & 37 \\ & -36 \\ \hline & 1 \end{array}$$

So, after dividing 37 by 4 we got $9\frac{1}{4}$

$\therefore$ The mixed fraction of $\frac{37}{4}$ is $9\frac{1}{4}$

Remember

$$\frac{37}{4}=\frac{36+1}{4}$$
$$=\frac{36}{4}+\frac{1}{4}$$
$$=9+\frac{1}{4}$$

Conversion of mixed fraction to Improper fraction

Example 1 : Let us express the following mixed fraction as improper fractions.

(i) $2\frac{1}{4}$ (ii) $5\frac{3}{7}$ (iii) $4\frac{5}{6}$

(i) $2\frac{1}{4} = 2+\frac{1}{4} = \frac{8}{4}+\frac{1}{4} = \frac{8+1}{4} = \frac{9}{4}$

(ii) $5\frac{3}{7} = \frac{35+3}{7} = \frac{38}{7}$

If we divide 35 by 7 we get the quotient 5.

(iii) $4\frac{5}{6} = \frac{4\times6+5}{6}$

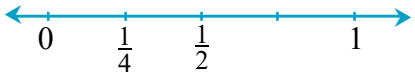
$= \frac{24+5}{6}$

$= \frac{29}{6}$

Multiplying 4 by 6 and then added to 5.

Fractions on the number line

Let us observe, how to show the fraction $\frac{1}{4}, \frac{1}{3}, \frac{1}{2}$ etc on the number line.



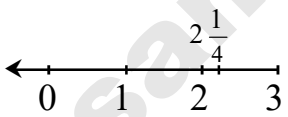
The portion between 0 and 1 of the number line is shown widely in the adjacent figure. Take a piece of the thread as long as the gap between 0 and 1. Fold the thread to get two equal pieces . One part of this is $\frac{1}{2}$. Now take one part of the thread and keep one end of the thread on '0' and the other end will be considered as $\frac{1}{2}$. Similarly if we divide a thread equally according to the gap between 0 and 1 into 4 equal parts, then each of these parts will be equal to $\frac{1}{4}$. One end of $\frac{1}{4}$ th part of the thread will coincide with '0' and the other end will be $\frac{1}{4}$.

Using this process, we can show the fraction $\frac{3}{4}, \frac{1}{3}, \frac{2}{3}$ etc on the number line. If we divide the length $\frac{1}{2}$ into two equal parts and consider one part of that, it will be equal to $\frac{1}{4}$ th part of the thread.

Again $\frac{4}{4}$ is dividing the gap between 0 and 1 equally into 4 parts and folding the thread equally into 4 folds. If each fold is placed by starting from 0 and moving towards the right, it will reach 1

Hence $\frac{4}{4}$ is 1 whole. $\frac{4}{4}$ can be shown by 1 on the number line. $\frac{0}{4}$ is the point zero.

Now, how can we show the improper fraction $2\frac{1}{4}$ on the number line?



Let us see

$2\frac{1}{4} = 2+\frac{1}{4}$ So, it will go towards right of 0. Now consider a thread of length equal to the gap between 2 and 3. Divide the thread into 4 equal parts. Take one of those parts, which will be equal to $\frac{1}{4}$. Take this $\frac{1}{4}$ part and put after 2 towards the right. That position will be $2\frac{1}{4}$.

In this way we can show $4\frac{2}{7}$, $5\frac{9}{10}$ ect. on the number line.

If we have to show $\frac{7}{2}$ on the number line, then we have to divide the length between 0 and 7 into 2 equal parts and consider one part of that. This will give $\frac{7}{2}$.

Do it yourself

1. Draw a number line and locate $\frac{1}{4}, \frac{2}{4}, \frac{3}{4}, \frac{4}{4}$.
2. Where to locate $\frac{0}{10}, \frac{3}{10}, \frac{7}{10}$ and $\frac{10}{10}$ on the number line.
3. Show $4\frac{2}{3}$ and $4\frac{1}{3}$ on the number line.

4. Draw a number line and locate the following on it.

(a) $\frac{1}{3}, \frac{2}{3}, \frac{3}{3}$ (b) $\frac{0}{5}, \frac{2}{5}, \frac{3}{5}, \frac{5}{5}$ (c) $\frac{1}{5}$ and $\frac{2}{10}$

(d) $\frac{1}{3}, \frac{2}{6}$ and $\frac{3}{9}$ (e) $3\frac{2}{7}, 3\frac{4}{7}, 3\frac{5}{7}$ (f) $\frac{5}{3}, \frac{7}{4}$ and $\frac{9}{5}$

5. (i) When does a fraction become equal to 1?

(ii) When does a fraction become less than 1?

6. Put (✓) on the correct relations and (×) on the incorrect one.

(a) $\frac{4}{4} < 1$ ☐ (b) $1 > \frac{1}{2}$ ☐

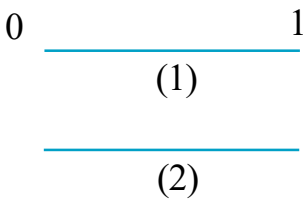
(c) $\frac{0}{3} = 0$ ☐ (d) $\frac{8}{8} = 1$ ☐

7. Write 5 improper fractions whose denominators are greater than10.

8. Write three mixed fractions. Write the mixed fractions as improper fractions form also.

9. Suppose $\frac{22}{5}$ indicates that 22 fruits are to be shared among 5 persons equally. Express this sharing by using some diagrams. How many whole fruits will be shared among them? After getting a whole fruit each, how many parts will each of them get?

Do it yourself

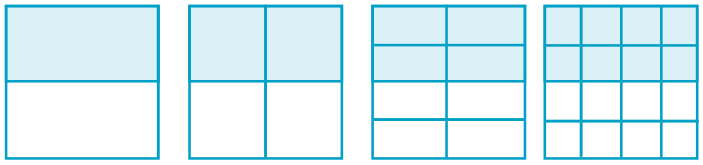


• Take 2 pieces of ropes which are equal to the length of your ruler • Make10 equal pieces of the 2nd rope • Consider 0 on the left end and 1 on the right end of the first rope • Now, go on placing the 5 pieces out of 10, from the end, 0 of the number 1 rope and put a mark after placing the last piece • Which fraction will be represented by this mark? Again taking 7 piece out of 10 and go on placing on the number 1 rope.

• Which fraction will be represented by this mark? Now, which of the two fractions is bigger?

Equivalent Fractions

Look at the pictures (1), (2), (3) and (4). All the big (original) squares are equal in size. All the shaded portions in the original big square are the representation of a single fraction. If we place the pictorial representation of one over the other, they are found to be equal . These fractions are $\frac{1}{2}, \frac{2}{4}, \frac{4}{8}$ and $\frac{8}{16}$, representing the parts taken from the total number of parts. Hence, the fractions $\frac{1}{2}$, $\frac{2}{4}, \frac{4}{8}$ and $\frac{8}{16}$ representing the same parts of the squares. These fractions are called equivalent fractions.

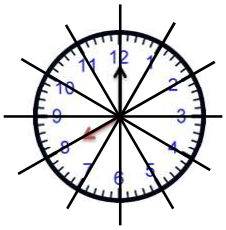


(1) (2) (3) (4)

Can you draw a picture and show that $\frac{1}{5}$ and $\frac{2}{10}$ are equivalent fractions?

Try yourself

1. Draw four circles of equal size. Show that $\frac{1}{2}, \frac{2}{4}, \frac{4}{8}$ and $\frac{8}{16}$ are equivalent fractions and that, they represent the same shared part of a whole and explain.
2. Draw three dials of a clock of equal size. Represent the fractions $\frac{3}{4}, \frac{5}{6}$ and $\frac{7}{12}$ on them and try to explain that they do not represent the same part of the dials.



Understanding equivalent fractions

We have found that $\frac{1}{2}, \frac{2}{4}, \frac{4}{8}$ and $\frac{8}{16}$ are all equivalent fractions.
Note that,

$$\frac{2}{4}=\frac{1\times2}{2\times2}, \qquad \frac{4}{8}=\frac{1\times4}{2\times4}, \qquad \frac{8}{16}=\frac{1\times8}{2\times8}$$

We multiplied both the numerator and the denominator of $\frac{1}{2}$ by the same number that means, firstly by 2, secondly by 4 and lastly by 8 and got the fractions.

$\frac{2}{4}, \frac{4}{8}$ and $\frac{8}{16}$ respectively. Similarly for $\frac{1}{5}$ and $\frac{2}{10}$, if we multiply both numerator and denominator of $\frac{1}{5}$ by 2, we get, $\frac{1\times2}{5\times2}=\frac{2}{10}$ So, $\frac{1}{5}$ and $\frac{2}{10}$ are equivalent fractions

From these examples, we can conclude that, to find an equivalent fraction of a given fraction, we have to multiply both the numerator and denominator of the given fraction by the same number.

Let us observe the following equivalent fractions.

(a) $\frac{1}{3}$

$\frac{1}{3}=\frac{1\times2}{3\times2}=\frac{2}{6}, \quad \frac{1}{3}=\frac{1\times3}{3\times3}=\frac{3}{9}, \quad \frac{1}{3}=\frac{1\times4}{3\times4}=\frac{4}{12}$ etc.

(b) $\frac{4}{7}$

$\frac{4}{7}=\frac{4\times2}{7\times2}=\frac{8}{14}, \quad \frac{4}{7}=\frac{4\times3}{7\times3}=\frac{12}{21}, \quad \frac{4}{7}=\frac{4\times4}{7\times4}=\frac{16}{28}$ etc.

Do it yourself

1. Find four equivalent fractions of $\frac{2}{9}$.
2. Find three equivalent fractions of $\frac{3}{8}$ (can you represent them with the help of pictures that they are equivalent)?

Look at figure-1, 8 balls out of 16 are shaded and so they represent the fraction $\frac{8}{16}$ In fig-2, the balls are further subdivided as A,B,C and D. Hence, 2 divisions out of 4 are completely shaded. So, their fraction is $\frac{2}{4}$. But both the figures, include the equal number of shaded balls. So, the equivalent fractions of $\frac{8}{16}$ is $\frac{2}{4}$. Let us observe, how we find the equivalent of $\frac{8}{16}$ from $\frac{2}{4}$.

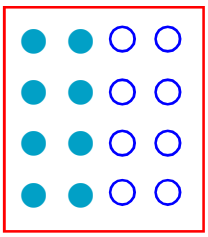


Fig -1

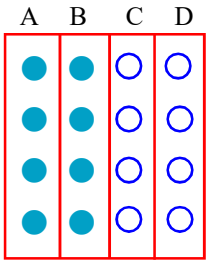


Fig -2

$\frac{8}{16}=\frac{8\div4}{16\div4}=\frac{2}{4}$

That means, to find an equivalent fraction, we may divide both the numerator and the denominator by the same number.

Example 1 : $\frac{27}{36}=\frac{27\div9}{36\div9}=\frac{3}{4}$

Example 2 : $\frac{39}{65}=\frac{39\div13}{65\div13}=\frac{3}{5}$

A special rule of equivalent fraction

Let us consider a fraction $\frac{2}{3}$. An equivalent fraction of this is $\frac{6}{9}$. So, we can write $\frac{2}{3}=\frac{6}{9}$ by applying the product as shown aside we can write-

$2 \times 9 = 18$ and $3\times6 = 18$

Both the products are equal.

Observe the multiplication $\frac{a}{b}=\frac{c}{d}$ are equivalent fractions. By multiplying the numerator of the first and denominator of the second and vice-versa. We get $a\times b$ and $b\times c$

Do it yourself (i) $\frac{15}{25}=\frac{3}{5}$ (ii) $\frac{4}{9}=\frac{36}{81}$

The process of this type of multiplication is called Cross Multiplication. By applying the cross multiplication in (i) and (ii) above you will find that both the products are same. So, for two equivalent fractions we found that, (numerator of the left fraction) × (denominator of the right fraction) = (denominator of the right fraction) × (numerator of the left fraction)

Let us fill in the blank by using the above process

Example : $\frac{4}{7}=\frac{\square}{56}$

Solution : First method $\frac{4}{7}=\frac{\square}{56}$

We can find 56, if we multiply 7 by 8. But for equivalent fraction, we have to multiply both the numerator and denominator by the same number. So, we have to multiply 4 also by 8 to fill in the blank space.

Thus, $\frac{4}{7}=\frac{4\times8}{7\times8}=\frac{\boxed{32}}{56}$

So, 32 is to be filled in the blank space. (Here cross multiplication is not used)

Second method : To get the number for the blank space, we write $\frac{4}{7}=\frac{\text{The number}}{56}$

Now, using cross multiplication rule, we get $7\times$ the number $=4\times56$.

So, $7\times$ the number $= 4\times56$

But, $7\times$ the number $= 4\times8\times7$

$= 32\times7$

Comparing both the sides, we get,

the number $= 32$

$\therefore$ In the blank space we have to write 32.

Observe how we arranged 4×56

$4\times56 = 4\times8\times7$

$= 32\times7$

$= 7\times32$

Lowest form of a fraction

Observe the following fractions,

$\frac{15}{35}, \frac{9}{21}, \frac{6}{14}$ and $\frac{3}{7}$

Leaving the last one from these, the numerator and denominator of each of the remaining 3 fractions can divided by some common numbers

For example, numerator and denominator of $\frac{15}{35}$ is divided by 5. Both the numerator and denominator of $\frac{9}{21}$ can be divided by 3. Similarly, both the numerator and denominator of $\frac{6}{14}$ can be divided by 2.

But for the last fraction $\frac{3}{7}$ both the numerator and denominator cannot be divided by any other number, other than 1. So, out of the four fractions given above, only $\frac{3}{7}$ is found to be in the lowest form.

For a fraction if both the numerator and denominator have no other common factor other than1, then that fraction is said to be in the lowest form.

Example 1 : $\frac{54}{72}$

So, $\frac{54}{72}=\frac{54\div2}{72\div2}=\frac{27}{36}$ [Both the numerator and denominator is divisible by 2]

$\frac{27}{36}=\frac{27\div3}{36\div3}=\frac{9}{12}$ [Numerator and denominator of $\frac{27}{36}$ is divisible by 3]

Again, $\frac{9}{12}=\frac{9\div3}{12\div3}=\frac{3}{4}$

$\therefore$ The numerator and denominator of $\frac{54}{72}$ is divided by 2, 3 and 3 sequentially; and we get $\frac{3}{4}$.

Also, the HCF of 72 and 54 is $2\times3\times3=18$, So, to find the equivalent fraction in the lowest form, we have to divide both the numerator and denominator by their HCF.

Example 2 : Find the lowest form of $\frac{84}{98}$

Solution : HCF of 84 and 98 is 14

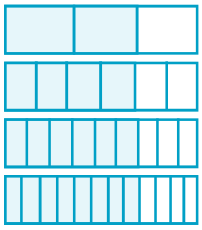
So, $\frac{84}{98}=\frac{84\div14}{98\div14}=\frac{6}{7}$

$\therefore$ The lowest form of $\frac{84}{98}$ is $\frac{6}{7}$

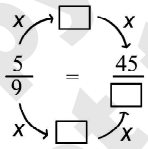
$84=2\times2\times3\times7$
$98=2\times7\times7$
$HCF=2\times7=14$

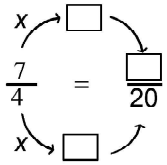
Do it yourself

1. Observe the adjoining figures. Write the fraction of the shaded parts in each of them. Are all these fraction equivalent?



2. Fill in the blanks

(a) 

(b) 

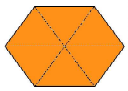
(c) $\frac{7}{5}=\frac{14}{\square}=\frac{\square}{15}=\frac{\square}{20}=\frac{35}{\square}=\frac{\square}{30}=\frac{49}{\square}=\frac{\square}{40}$

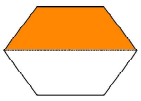
3. Look at the figure and write whether they are equal or not?-

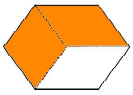
Fill in the blanks using these figures.

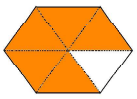
$\frac{\square}{\square}=\frac{\square}{\square}$

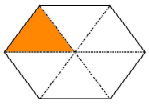
4. Put (✓) in the correct ones and (×) for the incorrect one.

If  =1 then

(i)  $=\frac{1}{2}$

(ii)  $=\frac{2}{3}$

(iii)  $=\frac{5}{6}$

(iv)  $=\frac{1}{6}$

5. (a) Find the equivalent fractions of $\frac{5}{8}$ having

(i) denominator 40 (ii) denominator 6 more than the numerator.

(b) Multiply both the numerator and denominator of $\frac{5}{8}$ by 2, 3, 4, 5, 6 respective and find the equivalent fractions accordingly. Find the different between the denominator and numerator of each of the fraction and write them serially. Doing so, did you find any pattern is them, mention.

6. Check whether each pair of fractions are equivalent.

(i) $\frac{3}{10}, \frac{15}{50}$ (ii) $\frac{7}{9}, \frac{42}{72}$

7. (a) Reduce the following fractions to the lowest form (dividing by the HCF of numerator and denominator in each case)

(i) $\frac{45}{60}$ (ii) $\frac{90}{150}$ (iii) $\frac{48}{72}$

(b) Reduce the following fractions to the lowest form by prime factorising the numerator and denominator in each case.

(i) $\frac{105}{195}$ (ii) $\frac{72}{104}$

Like and unlike fractions

Observe the fractions $\frac{3}{7}, \frac{5}{7}, \frac{1}{7}, \frac{13}{7}$ All have the same denominators.

Fractions with same denominators are called **like fractions.**

Again, the fractions $\frac{2}{5}, \frac{3}{8}, \frac{7}{15}, \frac{18}{7}$ have the different denominators.

The fractions with different denominator are called **unlike fractions.**

Try yourself

Write five like fractions and five unlike fractions. Look at the fractions written by your classmates.

Observe the two adjacent figures. Consider the division made from the same size of the objects. The portion of the whole corresponding to $\frac{1}{2}$ is clearly larger than the portion of the same whole corresponding to $\frac{1}{3}$.

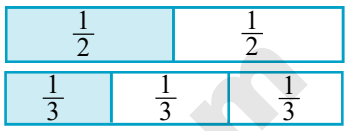


Fig-1

So, $\frac{1}{2} > \frac{1}{3}$

Do it yourself

Observe the shaded portion of the figure-2. Fill the following blank boxes using the signs > or <.

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

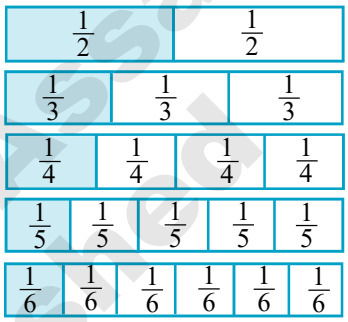
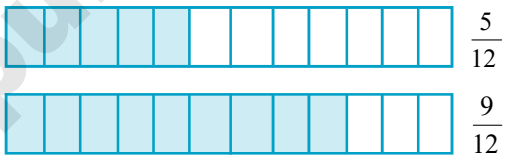


Fig-2

Comparing like fractions

In both the fractions, the two pieces of paper of same size is divided into 12 equal parts. The first piece has 5 shaded parts and the second one has 9 shaded parts. We take 5 and 9 parts respectively out of 12 equal parts and got the fractions $\frac{5}{12}$ and $\frac{9}{12}$ respectively. Clearly, outof 12 equal parts, the portion corresponding to 9 parts is larger than the portion corresponding to 5 parts. Hence, $\frac{9}{12} > \frac{5}{12}$. Also both of them are like fractions.



Let us know.

For two fractions with the same denominators, the fractions with the greater numerator is greater.

Do it yourself

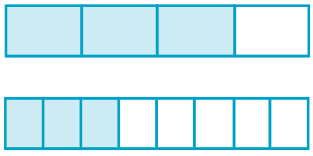
(i) How will you find, which one is the larger fraction between $\frac{15}{20}$ and $\frac{13}{20}$.

(ii) Write the fractions $\frac{3}{16}, \frac{19}{16}, \frac{8}{16}, \frac{9}{16}, \frac{13}{16}, \frac{5}{16}$ in descending order.

(iii) Which fraction is the biggest among $\frac{1}{6}, \frac{1}{2}, \frac{1}{9}$.

Comparing Unlike fractions

Let us consider a pair of unlike fractions $\frac{3}{4}$ and $\frac{3}{8}$ and find which of these two is greater? Take 2 pieces of paper of same size (12 cm each). We divide the first piece into 4 equal parts and colour 3 parts out of these.



Divide the second piece into 8 equal parts and colour 3 parts out of these. Now cut the 2 pieces of coloured parts and put one above the other. You will find that the portion of the whole showing $\frac{3}{4}$ is larger than the portion showing $\frac{3}{8}$. So, $\frac{3}{4} > \frac{3}{8}$.

Example 1 : Let us convert $\frac{4}{9}$ and $\frac{7}{15}$ into like fractions

Solution : Let us first find the LCM of 9 and 15.

$9 = 3 \times 3$

$15 = 3 \times 5$

$\therefore$ LCM $= 3 \times 3 \times 5 = 45$

Now, we have to get the equivalent fractions of the given fractions with the LCM of their denominators, here LCM is 45.

$\therefore \frac{4}{9} = \frac{4 \times 5}{9 \times 5} = \frac{20}{45}$ and $\frac{7}{15} = \frac{7 \times 3}{15 \times 3} = \frac{21}{45}$

$\therefore$ Required like fractions are $\frac{20}{45}$ and $\frac{21}{45}$

Let us know

If the numerator is same in two fractions, the fraction with the smaller denominator is greater of the two fractions.

Example 2 : Let us compare $\frac{3}{5}$ and $\frac{2}{7}$.

To compare them, we have to convert them into like fractions. For that we have to find the LCM of their denominators.

LCM of 5 and $7 = 5 \times 7 = 35$

Now, we have to find the equivalent fractions of $\frac{3}{5}$ and $\frac{2}{7}$ with the same denominator 35. (That is equalise the LCM of the denominators).

So, $\frac{3}{5} = \frac{3 \times 7}{5 \times 7} = \frac{21}{35}$ and $\frac{2}{7} = \frac{2 \times 5}{7 \times 5} = \frac{10}{35}$

Here, $\frac{21}{35} > \frac{10}{35}$ $\therefore$ $\frac{3}{5} > \frac{2}{7}$

Example 3 : Let us find which one of $\frac{5}{8}$ and $\frac{5}{8}$ is grater.

Solution : Let us find the equivalent fractions of the two given fractions. For that we have to find the LCM of both the denominators and it is 40 here.

Now, $\frac{5}{8}=\frac{5\times5}{8\times5}=\frac{25}{40}$

and $\frac{13}{20}=\frac{13\times2}{20\times2}=\frac{26}{40}$

Now, out of 2 equivalent fractions $\frac{25}{40}$ and $\frac{26}{40}$, $\frac{26}{40}>\frac{25}{40}$

$\therefore \frac{13}{20}>\frac{5}{8}$

$2\,|\,8$ and $2\,|\,20$

$2\,|\,4$ $\quad$ $2\,|\,10$

2 $\quad$ 5

So, $8 = ② \times ② \times 2$

$20 = ② \times ② \times 5$

$\therefore$ LCM $= 2 \times 2 \times 2 \times 5$

$= 40$

Example 4 : Let us arrange the fractions $\frac{2}{3}, \frac{3}{7}$ and $\frac{7}{9}$ in descending order.

Solution : First of all we have to convert the given fractions into like fractions.

$\frac{2}{3}=\frac{2\times21}{3\times21}=\frac{42}{63}$

$\frac{3}{7}=\frac{3\times9}{7\times9}=\frac{27}{63}$

$\frac{7}{9}=\frac{7\times7}{9\times7}=\frac{49}{63}$

LCM of 3, 7, 9

$3\,|\,3,\ 7,\ 9$

$1,\ 7,\ 3$

$\therefore$ LCM $= 3\times1\times7\times3$

$= 63$

Now, $\frac{49}{63}, \frac{42}{63}, \frac{27}{63}$ are in descending order.

$\therefore$ Descending order of the given fractions is $\frac{7}{9}, \frac{2}{3}, \frac{3}{7}$

Example 5 : Let us compare the two fractions $4\frac{1}{5}$ and $5\frac{1}{3}$.

Solution : In the two given fractions, first one has 4 whole things and the second one has 5 whole things. The fractions with more whole things is greater than the other one.

So, $5\frac{1}{3}$ is greater than $4\frac{1}{5}$.

Example 6 : Let us find which one of the fraction $3\frac{2}{5}$ and $3\frac{3}{4}$ is greater?

Solution : In these two mixed fractions, both have the whole parts equal. So, we have to compare the 'parts' included with them and then compare which one is bigger.

Now, $\frac{2}{5}=\frac{2\times4}{5\times4}=\frac{8}{20}$

and $\frac{3}{4}=\frac{3\times5}{4\times5}=\frac{15}{20}$

Here, $\frac{15}{20}>\frac{8}{20}$ So, $\frac{3}{4}>\frac{2}{5}$

Hence, $3\frac{3}{4} > 3\frac{2}{5}$

LCM of the denominator of $\frac{2}{5}$ and $\frac{3}{4}$ is 20

Note : Anshuman has one 100 rupee note and one 10 rupee note with him. Rangfor has one 100 rupee note and one 20 rupee note with him. Which one has more money with him.

Do it yourself

1. Find which of the following pairs of fractions is like fraction.

(a) $\frac{6}{11},\frac{2}{11}$ (b) $11\frac{2}{4}, 11\frac{3}{5}$ (c) $\frac{5}{9},\frac{5}{11}$ (d) $\frac{5}{6},\frac{6}{5}$

(e) $\frac{7}{8},\frac{9}{5}$ (f) $\frac{3}{4},\frac{12}{8}$ (g) $\frac{1}{2},\frac{1}{3}$ (h) $\frac{3}{3},\frac{3}{7}$

2. Find which one of each pair of fractions is greater.

(a) $\frac{3}{4}, \frac{2}{5}$ (b) $\frac{5}{8}, \frac{7}{10}$ (c) $\frac{5}{6}, \frac{11}{15}$

(d) $4\frac{3}{5}, 5\frac{2}{7}$ (e) $8\frac{2}{7}, 8\frac{3}{8}$

3. Convert them to their lowest form and then compare them.

(i) $\frac{10}{15}, \frac{25}{75}$ (ii) $\frac{40}{64}, \frac{96}{120}$

4. Find which one of each pair of fractions is smaller, with the help of the diagrams

(a) $\frac{3}{4}, \frac{2}{6}$ (b) $\frac{3}{3}, \frac{3}{7}$ (c) $\frac{3}{5}, \frac{2}{3}$

5. (a) Arrange the fractions in descending order.

(i) $\frac{3}{8}, \frac{9}{16}, \frac{19}{24}, \frac{1}{4}$ (ii) $\frac{3}{2}, \frac{11}{18}, \frac{22}{27}, \frac{7}{9}$

(b) Arrange them fractions in ascending order.

(i) $\frac{3}{10}, \frac{13}{15}, \frac{6}{7}, \frac{4}{5}$ (ii) $\frac{10}{21}, \frac{31}{42}, \frac{13}{14}, \frac{5}{7}$

6. After observing the adjacent figure, put (✓) in correct answers and (×) in incorrect ones.

(a) Shaded portion of the figure-1 indicates $\frac{1}{4}$ part of the square.

(b) Shaded portion of the figure-2 indicates $\frac{1}{4}$ part of the square.

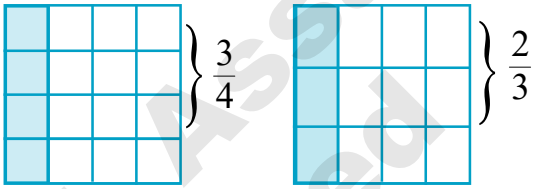


fig -1 fig -2

(c) The rows shown by the bracket of the figure-1 indicate the $\frac{3}{4}$ parts of the square.

(d) The rows shown by the bracket of the figure-2 indicate the $\frac{2}{3}$ parts of the square.

7. Except sundays, Barnali spends her time every day in the week from morning 6 o' clock to evening 6' o clock in the following ways :- from moning 6' o clock to 8' o clock for studies, 8' o clock to 9' o clock, preparation for going to school, 9' o clock to 3' o clock in the afternoon, at school, 3' o clock in the afternoon to 4' o clock, comes back from school, take lunch and rest for sometime, 4' o clock to 5' o clock, for games and sports, 5' o clock to 6' o clock washes hands and feet, says her prayers and prepares for evening hours study.

Draw a dial of the clock and show the times spent by Barnali on it and express the parts in fractions find the largest fraction among these.

8. From two different High Schools, the number of students who appeared for the HSLC examination are 80 and 90 respectively. 60 students from the first school and 72 from the second were successful by securing first division. From which school, did the highest number of students pass in first division.

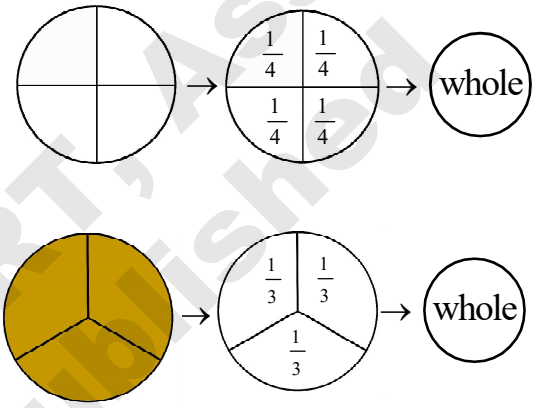
Addition and Subtraction of Fractions

some activites of our daily life.

Starts

Suppose a milkman supplies 1 litre of milk to your house. The muilkman measures the milk with a half litre can. Do you observe how a milkman measures the milk. He has to measure two times by this half litre can to give one litre of milk. From this we can easily say that $\frac{1}{2}+\frac{1}{2}=1$.

If we divide an apple into four equal parts, then one part is called $\frac{1}{4}$ of the apple. If we unite the four parts again, we get the whole apple again, From this we can say that $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}=1$.

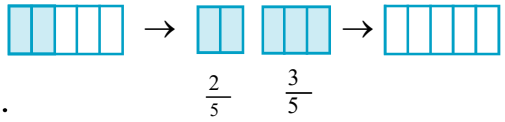


Again, if a round object is divided into three equal parts, then each part is called $\frac{1}{3}$ of that object. If we unite the three parts again, we get the whole round object.

So, $\frac{1}{3}+\frac{1}{3}+\frac{1}{3}=1$.

Let us observe another example-

A piece of paper is divided into 5 equal parts. From this $\frac{2}{5}$ parts is given to Madhu and $\frac{3}{5}$ parts to Dhan. Again, if we unite the two pieces together, do we get the same piece of paper?



We can understand in this way also, $\frac{2}{5}+\frac{3}{5}=1$.

Do it yourself

Take two equal pieces of paper as shown in the figure. Draw 36 small squares of equal size in them. As shown in the figure-1, separate the piece 'A' and 'B' having 8 small squares. Now you got two pieces of $\frac{8}{36}$ of the paper. As shown in the figure-2.

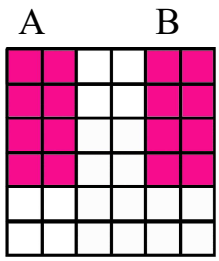


Fig -1

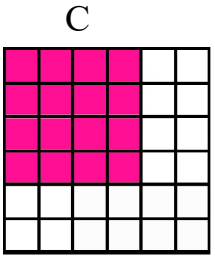


Fig -2

Separate $\frac{16}{36}$ piece of paper. Now place 2 pieces of $\frac{8}{36}$ on the $\frac{16}{36}$ piece. Examine the whether these two small pieces are equal to the single big piece. Yes, these two small pieces are equal to the big piece. So, it is clear that,

$\frac{8}{36}+\frac{8}{36}$ gives $\frac{16}{36}$.

So, we can write in this way also,

$\frac{8}{36}+\frac{8}{36}=\frac{8+8}{36}=\frac{16}{36}$

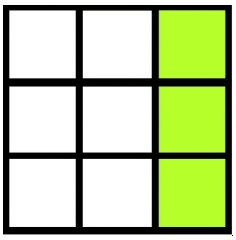
That means, to add two or more fractions having same denominator, we have to add the numerators only keeping the denominator same.

Example : Add the fractions $\frac{6}{17}$, $\frac{4}{17}$ and $\frac{3}{17}$.

Solution : $\frac{6}{17}+\frac{4}{17}+\frac{3}{17}=\frac{6+4+3}{17}=\frac{13}{17}$

Let us see from an example how the subtraction of fractions is to be done

In the adjoining figure $\frac{3}{9}$ parts is coloured $\frac{6}{9}$ parts of the picture is not coloured. Let us see, how can we get the portion which is not coloured. To get this, if we cut the coloured part from the whole picture, will it do? You can examine the same at home.



So, we got, (We know that, $\frac{9}{9}=1$)

The parts which are not coloured = Whole – the coloured parts

$=1-\frac{3}{9}$

$=\frac{9}{9}-\frac{3}{9}$ $\rightarrow (1)$

Again, from the picture the parts which are not coloured $=\frac{6}{9}$ $\rightarrow (2)$

So, from (1) and (2) the parts which are not coloured to be equal.

$\therefore$ We can write, $\frac{9}{9}-\frac{3}{9}=\frac{9-3}{9}=\frac{6}{9}$

Let us know

To find the difference between two like fractions we have to subtract the smaller numerator from the bigger numerator by retaining the common denominator.

For example, $\frac{16}{21}-\frac{11}{21}=\frac{16-11}{21}=\frac{5}{21}$

Do it yourself

1. Fill in the blank spaces by observing the pictures aside.

$\frac{\boxed{?}}{\boxed{?}}+\frac{\boxed{?}}{\boxed{?}}=\frac{\boxed{?}}{\boxed{?}}$

2. To get $\frac{19}{24}-\frac{13}{24}=\frac{6}{24}$, draw some circles like above and explain the steps.

3. Find the value of (i) $\frac{3}{17}+\frac{4}{17}+\frac{6}{17}$ (ii) $\frac{9}{26}+\frac{13}{26}$ (iii) $\frac{29}{51}+\frac{31}{51}$

(iv) $1+\frac{7}{23}$ (v) $\frac{23}{27}-\frac{10}{27}$ (vi) $\frac{14}{25}-\frac{11}{25}$ (vii) $1-\frac{31}{35}$ (viii) $4-\frac{14}{4}$

4. Priti and Riti's mother kept the glass full of milk an the table. She asked them to share the glass of milk Priti took $\frac{2}{4}$ parts of the milk and Riti took $\frac{1}{2}$ part. How much milk was left in the glass?

5. From an exercise, $\frac{5}{19}$ parts of the sums are solved by the class teacher. The students themselves solved $\frac{3}{19}$ part of the sums what part of the exercise are left to solve?

Addition and Subtraction of Unlike Fractions

For addition and subtraction of unlike fractions we have to express them into like (with same denominator) fractions. Again, to add or subtract the mixed fractions we have to convert the mixed fractions into improper fractions and then express them with same denominator and proceed accordingly.

Example : Add $\frac{4}{5}$ and $\frac{1}{7}$

Solution : First of all we have to convert them into the fractions with equal denominator. Their common denominator is 35 (LCM of 5 and 7).

$\therefore \quad \frac{4}{5}=\frac{4\times7}{5\times7}=\frac{28}{35}$ and $\frac{1}{7}=\frac{1\times5}{7\times5}=\frac{5}{35}$

So, $\frac{4}{5}+\frac{1}{7}=\frac{28}{35}+\frac{5}{35}=\frac{28+5}{35}=\frac{33}{35}$

LCM of the denominator's 5 and 7 is $= 5\times 7 = 35$

Addition of fractions can be done in other way also. Find the LCM of the two denominators and consider it as the common denominator. Then divide the common denominator by the denominator of the first fraction and multiply the numerator of the first fraction with the quotient thus found and put them as first part. Similarly divide the common denominator (LCM) by the denominator of the second fraction and multiply the quotient thus found with the numerator of the second fraction and put them on the second part. Observe the following steps for better understanding.

$\frac{4}{5}+\frac{1}{7}$

$=\frac{7\times4+5\times1}{35}$

$=\frac{28+5}{35}$

$=\frac{33}{35}$

(The common LCM is the product of 5 and 7. Now by dividing 35 by 5, we get the quotient 7, and multiply the quotient by 4. Similarly, repeat the steps for the second fraction)

Do it yourself

(i) $\frac{5}{9}+\frac{11}{15}$ (ii) $\frac{7}{12}+\frac{13}{20}$

Let us subtract $\frac{7}{8}$ from $\frac{1}{6}$

Solution : $\frac{7}{8}-\frac{1}{6}$

$=\frac{7\times3}{8\times3}-\frac{1\times4}{6\times4}$

$=\frac{21}{24}-\frac{4}{24}$

$=\frac{21-4}{24}$ $=\frac{17}{24}$

LCM of 8 and 6 is.

$2 \mid 8, 6$

$2 \mid 4, 3$

$2, 3$

$\therefore$ LCM $= 2\times2\times2\times3$

$= 24$

Let us add

Example 1 : Add $3\frac{2}{5}$ and $7\frac{1}{4}$

Solution :

First method : $3\frac{2}{5}+7\frac{1}{4}=(3+\frac{2}{5})+(7+\frac{1}{4})$

$=(3+7)+(\frac{2}{5}+\frac{1}{4})$ (Separate the whole and the fractions)

$=10+(\frac{4\times2+5\times1}{20})$

$=10+\frac{8+5}{20}=10+\frac{13}{20}=10\frac{13}{20}$ (LCM of 5 and 4= 20)

Second method : $3\frac{2}{5}+7\frac{1}{4}=\frac{3\times5+2}{5}+\frac{7\times4+1}{4}$

$=\frac{15+2}{5}+\frac{28+1}{4}$

$=\frac{17}{5}+\frac{29}{4}$

$=\frac{4\times17+5\times29}{20}=\frac{68+145}{20}$

$=\frac{213}{20}=\frac{200+13}{20}$

$=\frac{200}{20}+\frac{13}{20}=10+\frac{13}{20}=10\frac{13}{20}$

Example 2 : $7\frac{5}{6}-4\frac{2}{5}$

Solution : $7\frac{5}{6}-4\frac{2}{5}=(7+\frac{5}{6})-(4+\frac{2}{5})=7+\frac{5}{6}-4-\frac{2}{5}$

$=(7-4)+(\frac{5}{6}-\frac{2}{5})=3+(\frac{5\times5-6\times2}{30})$

$=3+\frac{25-12}{30}=3+\frac{13}{30}=3\frac{13}{30}$

Example 3 : Which one is bigger between $\frac{1}{6}$ and $\frac{1}{5}$ and is how much bigger?

Solution : To compare the two fractions, we have to make both the denominators same. Here, LCM of 6 and 5 = $6\times5=30$

So, $\frac{1}{6}=\frac{1\times5}{6\times5}=\frac{5}{30}$ and $\frac{1}{5}=\frac{1\times6}{5\times6}=\frac{6}{30}$

So, by comparing $\frac{5}{30}$ and $\frac{6}{30}$ we get $\frac{6}{30}>\frac{5}{30}$

$\therefore \quad \frac{1}{5}>\frac{1}{6}$

Now, by subtracting the smaller fraction from bigger one we get.

$$\frac{1}{5}-\frac{1}{6}=\frac{6\times1-5\times1}{30}=\frac{6-5}{30}=\frac{1}{30}$$

Hence, $\frac{1}{5}$ is $\frac{1}{30}$ times greater than $\frac{1}{6}$.

Example 4 : What to be added to $3\frac{2}{5}$ to get $7\frac{3}{8}$?

Solution : To get the required number, we have to subtract $3\frac{2}{5}$ from $7\frac{3}{8}$.

So, $7\frac{3}{8}-3\frac{2}{5}=\frac{7\times8+3}{8}-\frac{3\times5+2}{5}$

$$=\frac{59}{8}-\frac{17}{5}$$

$$=\frac{5\times59-8\times17}{40}$$

$$=\frac{295-136}{40}=\frac{159}{40}$$

$$=3\frac{39}{40}$$

LCM of 8 and 5 is
$= 8\times5= 40$

$$40\overline{)159}\ 3,\ 120,\ 39$$

$\therefore$ The required number is $=3\frac{39}{40}$

Example 5 : What is to be subtracted from $8\frac{3}{10}$ to get $3\frac{1}{7}$.

Solution : $8\frac{3}{10}-3\frac{1}{7}=\frac{80+3}{10}-\frac{21+1}{7}$

$=\frac{83}{10}-\frac{22}{7}$ $=\frac{7\times83-10\times22}{70}$

$=\frac{581-220}{70}=\frac{361}{70}=5\frac{11}{70}$

So, if we subtract $5\frac{11}{70}$ from $8\frac{3}{10}$, we get $3\frac{1}{7}$.

LCM = $10\times7=70$

Let us simplify, $2\frac{1}{3}-\frac{3}{4}+3\frac{1}{4}-1\frac{2}{3}$

Solution : $2\frac{1}{3}-\frac{3}{4}+3\frac{1}{4}-1\frac{2}{3}$

$=(\frac{7}{3}+\frac{13}{4})-(\frac{3}{4}+1\frac{2}{3})=(\frac{28+39}{12})-(\frac{3}{4}+\frac{5}{3})$

$=(\frac{67}{12})-(\frac{9+20}{12})=\frac{67}{12}-\frac{29}{12}=\frac{67-29}{12}$

$=\frac{38}{12}=3\frac{2}{12}=3\frac{1}{6}$

Exercise

1. Add the following :-

(a) $\frac{2}{3}+\frac{1}{4}$ (b) $\frac{4}{7}+\frac{2}{9}$ (c) $\frac{3}{4}+\frac{4}{3}$ (d) $1+\frac{3}{5}$ (e) $5+\frac{1}{7}$

(f) $\frac{2}{3}+\frac{1}{4}+\frac{1}{2}$ (g) $5\frac{3}{4}+6\frac{1}{4}+3\frac{1}{8}$ (h) $3\frac{1}{5}+7+2\frac{1}{3}$ (i) $4+\frac{2}{7}+\frac{1}{2}+\frac{11}{14}$

2. Subtract the following :- (a) $\frac{2}{3}-\frac{1}{6}$ (b) $\frac{7}{8}-\frac{1}{2}$ (c) $8\frac{5}{9}-4$ (d) $9\frac{5}{7}-3\frac{1}{5}$

(e) $12\frac{7}{10}-7\frac{1}{15}$ (f) $3-2\frac{1}{3}$ (g) $9-\frac{16}{5}$

3. Simplify- (a) $\frac{3}{4}+\frac{1}{6}+\frac{1}{2}$ (b) $2\frac{3}{4}-\frac{1}{4}+\frac{1}{3}$ (c) $3-\frac{2}{3}-\frac{2}{5}$

(d) $2\frac{1}{3}-1\frac{1}{3}+4\frac{2}{3}-2\frac{1}{3}$ (e) $4\frac{1}{3}-2\frac{3}{4}-3\frac{2}{3}+3\frac{1}{4}$

4. From one litre of milk Nabamallikas mother gave $\frac{1}{5}$ parts to Nabamallika and $\frac{2}{9}$ parts to Madhumalati to drink. How many parts in total from one litre of milk was taken by both of them?
5. From a bucket full of water, $\frac{7}{15}$ parts of water was used. How much water was left in the bucket?
6. To read a poem from a book, Rita takes $3\frac{4}{5}$ minutes of time and Mala takes $\frac{17}{4}$ minutes. Who takes more time to read the poem and by how much?
7. Birina's friends take $\frac{5}{9}$ parts of olives which was with her. How many parts are now left with her?
8. If $\frac{5}{8}$ is subtracted from a number, the difference becomes $\frac{1}{4}$. What is the number?
9. Subtract $6\frac{1}{5}$ from the sum of $3\frac{1}{5}$ and $4\frac{1}{3}$.
10. Robin went to the town with his father to sit for a competetive examination. Robin and his father start their journy from home and travelled $\frac{1}{12}$ parts of the distance by bicycle, after that they went by bus and lastly $\frac{1}{20}$ parts they went on foot. How many parts of the distance did they move by bus?

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Answers

1. (a) $\frac{11}{12}$ (b) $\frac{50}{63}$ (c) $\frac{25}{12}$ (d) $\frac{8}{5}$ (e) $\frac{36}{7}$
   (f) $\frac{17}{12}$ (g) $\frac{73}{8}$ (h) $\frac{188}{15}$ (i) $\frac{123}{14}$
2. (a) $\frac{1}{2}$ (b) $\frac{3}{8}$ (c) $\frac{41}{9}$ (d) $\frac{228}{35}$ (e) $\frac{169}{30}$ (f) $\frac{2}{3}$ (g) $\frac{29}{35}$
3. (a) $\frac{3}{2}$ (b) $6\frac{1}{12}$ (c) $\frac{29}{15}$ (d) $1\frac{1}{3}$ (e) $1\frac{1}{6}$
4. $\frac{19}{45}$ 5. $\frac{8}{15}$ 6. Mala will take more time. She will take $\frac{9}{20}$ parts.
7. $\frac{4}{9}$ 8. $\frac{7}{8}$ 9. $1\frac{1}{3}$ 10. $\frac{13}{15}$