

# Fractions



## INTRODUCTION

A fraction is a number which is used to represent a part of a collection or a whole. The fraction  $\frac{1}{3}$ , which means 1 part out of 3 equal parts, can be represented as 1 pencil out of a box of 3 pencils.

A fraction is a:

- part of a whole
- part of a collection.

A fraction comprises two numbers separated by a horizontal line. The number above the horizontal line is called the **numerator** and the number below the horizontal line is called the **denominator** of the fraction.

$$\frac{4}{7} = \frac{\text{(Numerator)}}{\text{(Denominator)}}$$

## Fraction as a part of a whole

A fraction is a part of a whole. Imagine a pizza cut into slices. All of the slices make 1 whole pizza. Each slice is a fraction of a pizza.

Tanya and Sanya want to share a pizza equally.

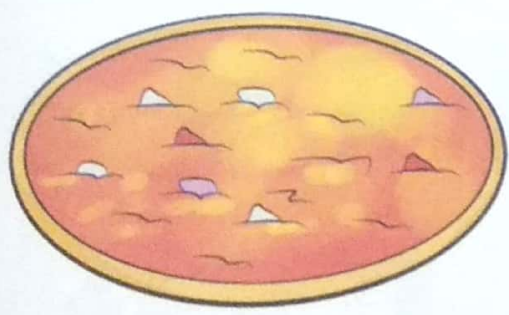


Fig. 6.1

They decide to cut the pizza from the middle and divide it into two equal parts. Each part is called the half of the whole and written as  $\frac{1}{2}$ . Both the sisters get an equal share. The  $\frac{1}{2}$  part of the whole is a fraction.

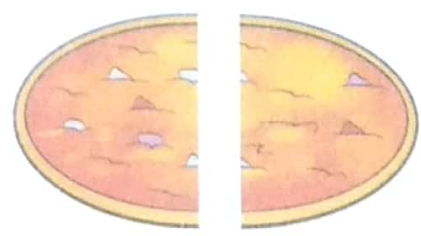


Fig. 6.2

Similarly we can take many examples from our daily lives to show a fraction as a part of a whole.

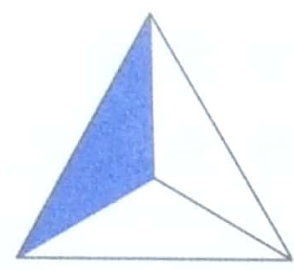


Fig. 6.3

In this figure, we have divided a triangle into 3 equal parts. The shaded part shows one part out of three—that is,  $\frac{1}{3}$ . Here  $\frac{1}{3}$  is a fraction. It is a part of the whole triangle.

## Fraction as a part of a collection

A fraction represents part of a collection, the numerator represents the number of parts we have and the denominator represents the total number of parts in the collection.

Let us take a collection of 12 stars and shade  $\frac{3}{4}$  of the collection.



Fig. 6.4

In order to find  $\frac{3}{4}$  of the 12 stars, we divide the 12 stars into four equal parts.



Fig. 6.5

Each part contains 3 stars. Now we shade 3 parts out of 4 parts.



Fig. 6.6

On counting, we find that the total number of shaded stars is 9.

In other words,  $\frac{3}{4}$  of 12 stars = 9 stars.

## Types of fractions

**Like fractions:** Fractions with the same denominators are called like fractions.

Examples:  $\frac{1}{7}$ ,  $\frac{3}{7}$ ,  $\frac{2}{7}$ , and  $\frac{6}{7}$  are like fractions.

**Unlike fractions:** Fractions with different denominators are called unlike fractions.

Examples:  $\frac{2}{3}$ ,  $\frac{5}{7}$ ,  $\frac{6}{8}$ , and  $\frac{1}{3}$  are unlike fractions.

**Unit fraction:** A fraction with the numerator as 1 is called a unit fraction.

Examples:  $\frac{1}{3}$ ,  $\frac{1}{9}$ ,  $\frac{1}{8}$ , and  $\frac{1}{5}$  are unit fractions.

**Proper fraction:** A fraction whose numerator is smaller than its denominator is called a proper fraction.

Examples:  $\frac{2}{3}$ ,  $\frac{5}{7}$ ,  $\frac{1}{6}$ , and  $\frac{3}{9}$  are proper fractions.

**Improper fraction:** A fraction whose numerator is greater than or equal to its denominator is called an improper fraction.

Examples:  $\frac{4}{3}$ ,  $\frac{7}{5}$ , and  $\frac{9}{9}$  are improper fractions.

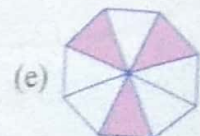
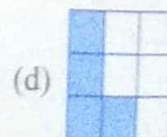
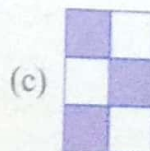
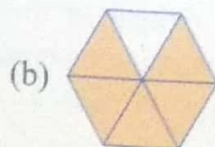
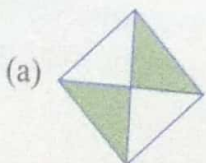
**Mixed fraction:** A fraction that is a combination of a whole number and a proper fraction is called a mixed fraction. All improper fractions can be written in the form of mixed fractions.

Examples:  $2\frac{1}{4}$  is a mixed fraction, since 2 is a whole number and  $\frac{1}{4}$  is a proper fraction.

## RECAP EXERCISE



1. What part of the figures are shaded?



2. Convert the following improper fractions into mixed fractions:

- (a)  $\frac{13}{7}$       (b)  $\frac{23}{17}$       (c)  $\frac{5}{2}$       (d)  $\frac{31}{19}$       (e)  $\frac{35}{12}$

3. Convert the following mixed fractions into improper fractions:

- (a)  $2\frac{3}{5}$       (b)  $3\frac{1}{9}$       (c)  $4\frac{1}{8}$       (d)  $1\frac{2}{5}$       (e)  $3\frac{3}{5}$

4. Circle the proper fractions from the following:

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

5. Write the numerator and denominator of each fraction:

- (a)  $\frac{2}{3}$  — N: 2, — D: 3      (b)  $\frac{6}{13}$  — N: 6, — D: 13      (c)  $\frac{14}{29}$  — N: 14, — D: 29      (d)  $\frac{17}{25}$  — N: 17, — D: 25      (e)  $\frac{23}{29}$  — N: 23, — D: 29

6. Express the following as fractions:

- (a) Two-seventeenths      (b) Four-thirteenths  
(c) Sixth-ninths      (d) Five-eighteenths

7. Express the following statements in fractions:

- (a) take three marbles out of four marbles.  $\rightarrow \frac{3}{4}$   
(b) eat two chocolates out of seven chocolates.  $\rightarrow \frac{2}{7}$   
(c) give five pieces of pizza from twelve pieces of pizza.  $\rightarrow \frac{5}{12}$   
(d) colour six circles out of eight circles.  $\rightarrow \frac{6}{8}$

## EQUIVALENT FRACTIONS

To understand the concept of equivalent fractions, let us take an example—Rama gave her four children a cake each. The first child cut his cake into two equal halves and ate one-half. The second child cut his cake into four equal parts and ate two pieces out of four. The third child cut his cake into six equal parts and ate three of them, and the fourth child cut the cake into eight equal pieces and ate four of them.

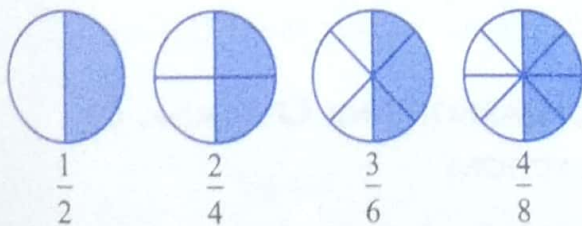


Fig. 6.7

Do you think they have eaten equal parts of the cake?

1st child ate  $\frac{1}{2}$  of the cake.

2nd child ate  $\frac{2}{4}$  of the cake.  $\left( = \frac{1}{2} \text{ of the cake} \right)$

3rd child ate  $\frac{3}{6}$  of the cake.  $\left( = \frac{1}{2} \text{ of the cake} \right)$

4th child ate  $\frac{4}{8}$  of the cake.  $\left( = \frac{1}{2} \text{ of the cake} \right)$

This means each child ate  $\frac{1}{2}$  of the cake. Thus, fractions  $\frac{1}{2}$ ,  $\frac{2}{4}$ ,  $\frac{3}{6}$ , and  $\frac{4}{8}$  represent the same fraction. These are called equivalent fractions. Thus two or more fractions which represent the same part (value) of the whole are called **equivalent fractions**.

## Fractions

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Recap exercise

Q.2 Convert the following improper fractions into mixed fractions!

(a)  $\frac{13}{7}$  (b)  $\frac{23}{17}$  (c)  $\frac{57}{2}$  (d)  $\frac{31}{19}$  (e)  $\frac{35}{12}$

Solution! - (a)  $\frac{13}{7} = 7 \overline{) 13} = 1 \frac{6}{7} = Q \frac{R}{D}$

$\frac{13}{7} = 1 \frac{6}{7}$  ans.

(b)  $\frac{23}{17} = 17 \overline{) 23} = 1 \frac{6}{17}$

$\frac{23}{17} = 1 \frac{6}{17}$  ans.

(c) (d) (e) solve by yourself.

Q.3 Convert the following mixed fractions into improper fractions

(a)  $2 \frac{3}{5}$  (b)  $3 \frac{1}{9}$  (c)  $4 \frac{1}{8}$  (d)  $1 \frac{2}{5}$  (e)  $3 \frac{3}{5}$

Solution! - (a)  $2 \frac{3}{5}$

$Q \frac{R}{D} = \text{Divisor} \times \text{Quotient} + \text{Remainder}$

$$\Rightarrow 2\frac{3}{5} = 5 \times 2 + 3$$
$$= 10 + 3$$
$$= 13$$

$$\Rightarrow 2\frac{3}{5} = \frac{13}{5} \quad \text{ans.}$$

$$(b) 3\frac{1}{9} = 9 \times 3 + 1$$
$$= 27 + 1$$
$$= 28$$

$$\Rightarrow 3\frac{1}{9} = \frac{28}{9} \quad \text{ans.}$$

Q.6 Express the following as fractions:

(a) Two-seventeenths

Solution:  $\frac{2}{17}$

(b) Four-thirteenths

Sol.  $\frac{4}{13}$

(c) Sixth-ninths

Sol.  $\frac{6}{9}$

(d) five-eighteenths

Sol.  $\frac{5}{18}$

Hence the given fractions can be written as:

$$\frac{2}{3} = \frac{2 \times 280}{3 \times 280} = \frac{560}{840}$$

$$\frac{4}{5} = \frac{4 \times 168}{5 \times 168} = \frac{672}{840}$$

$$\frac{5}{6} = \frac{5 \times 140}{6 \times 140} = \frac{700}{840}$$

$$\frac{10}{21} = \frac{10 \times 40}{21 \times 40} = \frac{400}{840}$$

$$\frac{15}{40} = \frac{15 \times 21}{40 \times 21} = \frac{315}{840}$$

∴ The given fraction can be written as:

$$\frac{700}{840} > \frac{672}{840} > \frac{560}{840} > \frac{400}{840} > \frac{315}{840}$$

Descending order is:  $\frac{5}{6} > \frac{4}{5} > \frac{2}{3} > \frac{10}{21} > \frac{15}{40}$

### EXERCISE 6.1



1. Which of the following fractions are equivalent fractions?

(a)  $\frac{2}{5}, \frac{3}{5}$

(b)  $\frac{3}{7}, \frac{9}{21}$

(c)  $\frac{4}{9}, \frac{16}{27}$

(d)  $\frac{7}{9}, \frac{35}{45}$

(e)  $\frac{1}{2}, \frac{1}{3}$

(f)  $\frac{8}{10}, \frac{24}{30}$

2. Write the first five equivalent fractions of the following:

(a)  $\frac{9}{11}$

(b)  $\frac{4}{5}$

(c)  $\frac{5}{13}$

(d)  $\frac{3}{7}$

(e)  $\frac{2}{9}$

(f)  $\frac{13}{15}$

3. Convert the following fractions into their lowest terms (simplest forms):

(a)  $\frac{250}{360}$

(b)  $\frac{175}{325}$

(c)  $\frac{220}{750}$

(d)  $\frac{820}{1600}$

(e)  $\frac{57}{76}$

(f)  $\frac{22}{121}$

4. Fill in the blanks:

(a)  $\frac{2}{\square} = \frac{32}{48} = \frac{30}{\square}$

(b)  $\frac{3}{5} = \frac{24}{\square} = \frac{\square}{60}$

5. Compare the following using  $>$ ,  $<$ , or  $=$ :

(a)  $\frac{2}{5} \square \frac{1}{7}$

(b)  $\frac{5}{11} \square \frac{4}{13}$

(c)  $\frac{7}{14} \square \frac{1}{2}$

(d)  $\frac{3}{18} \square \frac{3}{9}$

6. Arrange the following fractions in ascending order:

$$\frac{1}{3}, \frac{2}{5}, \frac{4}{15}, \frac{3}{10}, \frac{5}{20}, \frac{6}{21}$$

7. Arrange the following fractions in descending order:

$$2, \frac{2}{3}, \frac{3}{4}, \frac{5}{6}, \frac{7}{8}, \frac{9}{10}$$

8. A builder uses  $\frac{2}{5}$  of available land for roads and parks,  $\frac{3}{8}$  for the community hall, and rest in construction of apartments. Which of these gets the maximum portion of the land?

9. In an examination,  $\frac{5}{12}$  of the total marks were allotted to maths,  $\frac{3}{12}$  to literature, and rest to physical education and arts. Arrange the given subjects in increasing order of their allotments.

10. Sunita reads  $\frac{3}{5}$  of a book on the first day and  $\frac{1}{3}$  on the second day. On which day did she read more?

## OPERATIONS ON FRACTIONS

Now we will learn how to add and subtract fractions.

### Addition and subtraction of like fractions

For adding and subtracting like fractions, we follow these steps:

**Step 1:** Add or subtract the numerators. The denominator of the sum or difference will be same as of the two fractions.

**Step 2:** Reduce the fraction to its lowest term.

**Step 3:** If the result is an improper fraction, convert it into a mixed fraction.

$$\begin{array}{l} \text{Addition or} \\ \text{subtraction} \\ \text{of fractions} \end{array} = \frac{\text{Sum or difference of the numerators}}{\text{Common denominator}}$$

**Example 6:** Find the sum of:

$$(a) \frac{3}{13} + \frac{9}{13} + \frac{2}{13} \quad (b) 3\frac{2}{5} + 7\frac{3}{5}$$

$$\text{Solution: (a) } \frac{3}{13} + \frac{9}{13} + \frac{2}{13} = \frac{3+9+2}{13} = \frac{14}{13} = 1\frac{1}{13}$$

$$(b) 3\frac{2}{5} + 7\frac{3}{5} = \frac{17}{5} + \frac{38}{5} = \frac{17+38}{5} = \frac{55}{5} = 11$$

**Example 7:** Subtract:  $\frac{12}{15} - \frac{13}{25}$

**Solution:** LCM of 15 and 25 = 75

$$\frac{12}{15} = \frac{12 \times 5}{15 \times 5} = \frac{60}{75}$$

$$\frac{13}{25} = \frac{13 \times 3}{25 \times 3} = \frac{39}{75}$$

$$\therefore \frac{12}{15} - \frac{13}{25} = \frac{60}{75} - \frac{39}{75} = \frac{21}{75} = \frac{7}{25}$$

### Addition and subtraction of unlike fractions

For adding or subtracting unlike fractions, we follow these steps:

**Step 1:** Find the LCM of denominators of the given fractions.

**Step 2:** Convert unlike fractions into like fractions by making LCM as their denominator.

**Step 3:** Add or subtract the like fractions.

**Example 8:** Add:  $4\frac{1}{2}$  and  $3\frac{1}{6}$ .

**Solution:** Convert into improper fraction:

$$4\frac{1}{2} + 3\frac{1}{6} = \frac{9}{2} + \frac{19}{6} = \frac{27+19}{6} = \frac{46}{6} = \frac{23}{3} = 7\frac{2}{3}$$

Alternative method:

1. Add 4 and 3—that is,  $4 + 3 = 7$

$$2. \frac{1}{2} + \frac{1}{6} = \frac{3+1}{6} = \frac{4}{6} = \frac{2}{3}$$

$$3. 4\frac{1}{2} + 3\frac{1}{6} = 7\left(\frac{1}{2} + \frac{1}{6}\right) = 7\frac{2}{3}$$

**Example 9:** Add:  $3\frac{1}{2}$ ,  $5\frac{2}{3}$ , and  $1\frac{2}{6}$ .

$$\text{Solution: } 3\frac{1}{2} + 5\frac{2}{3} + 1\frac{2}{6} = \frac{7}{2} + \frac{17}{3} + \frac{8}{6}$$

(Convert mixed fractions to improper fractions)

$$= \frac{7 \times 3}{2 \times 3} + \frac{17 \times 2}{3 \times 2} + \frac{8}{6} \quad (\text{LCM of 2, 3, and 6} = 6)$$

Q.1 which of the following fractions are equivalent fractions?

(a)  $\frac{2}{5}, \frac{3}{5}$  (b)  $\frac{3}{7}, \frac{9}{21}$  (c)  $\frac{4}{9}, \frac{16}{27}$

Solution:- Note:- for fraction  $\frac{a}{b}$  and  $\frac{c}{d}$

(i) If  $a \times d = b \times c$  then  $\frac{a}{b} = \frac{c}{d}$

(ii) If  $a \times d \neq b \times c$  then  $\frac{a}{b} \neq \frac{c}{d}$

(a)  $\frac{2}{5} \neq \frac{3}{5}$

$\Rightarrow 2 \times 5 = 3 \times 5$   
 $= 10 \neq 15$

Hence  $\frac{2}{5}$  and  $\frac{3}{5}$  are not equivalent fractions.

(b)  $\frac{3}{7} = \frac{9}{21}$

$\Rightarrow 3 \times 21 = 9 \times 7$

$\Rightarrow 63 = 63$

Hence  $\frac{3}{7}$  and  $\frac{9}{21}$  are equivalent

fractions.

Solve rest of questions by yourself as solved above.



Q2 write the first five equivalent fractions of the following:

(a)  $\frac{9}{11}$  (b)  $\frac{4}{5}$  (c)  $\frac{5}{13}$  (d)  $\frac{3}{7}$  (e)  $\frac{2}{9}$  (f)  $\frac{13}{15}$

solution: -  $\frac{9}{11} = \frac{9 \times 2}{11 \times 2} = \frac{18}{22}$

$$\frac{9}{11} = \frac{9 \times 3}{11 \times 3} = \frac{27}{33}$$

$$\frac{9}{11} = \frac{9 \times 4}{11 \times 4} = \frac{36}{44}$$

$$\frac{9}{11} = \frac{9 \times 5}{11 \times 5} = \frac{45}{55}$$

$$\frac{9}{11} = \frac{9 \times 6}{11 \times 6} = \frac{54}{66}$$

Hence the five equivalent fractions of  $\frac{9}{11}$  are:

$$\frac{18}{22}, \frac{27}{33}, \frac{36}{44}, \frac{45}{55}, \frac{54}{66}$$

(b)  $\frac{4}{5}$

$$\Rightarrow \frac{4}{5} = \frac{4 \times 2}{5 \times 2} = \frac{8}{10}, \quad \frac{4}{5} = \frac{4 \times 3}{5 \times 3} = \frac{12}{15}$$

$$\frac{4}{5} = \frac{4 \times 4}{5 \times 4} = \frac{16}{20}, \quad \frac{4}{5} = \frac{4 \times 5}{5 \times 5} = \frac{20}{25}$$

$$\frac{4}{5} = \frac{4 \times 6}{5 \times 6} = \frac{24}{30}$$

Hence the five equivalent fractions of

$\frac{4}{5}$  are:  $\frac{8}{10}, \frac{12}{15}, \frac{16}{20}, \frac{20}{25}, \frac{24}{30}$

Solve rest 4 questions by yourself.

Q.3 Convert the following fractions into their lowest terms (simplest forms).

(a)  $\frac{250}{360}$  (b)  $\frac{175}{325}$  (c)  $\frac{220}{750}$

Solution! - (a)  $\frac{250}{360}$

find the HCF of the numerator and the denominator.

HCF by long division

$$\begin{array}{r} 1 \\ 250 \overline{) 360} \\ \underline{-250} \quad 2 \\ 110 \overline{) 250} \\ \underline{-220} \quad 3 \\ 30 \overline{) 110} \\ \underline{-90} \quad 1 \\ 20 \overline{) 30} \\ \underline{-20} \quad 2 \\ 10 \overline{) 20} \\ \underline{-20} \\ 00 \end{array}$$

last divisor ←

∴ HCF of 250 and 360 is 10.

Dividing the numerator and denominator by their HCF.

$$\frac{250 \div 10}{360 \div 10} = \frac{25}{36}$$

Therefore  $\frac{25}{36}$  is the lowest form of the given fraction.

$$(b) \frac{175}{325}$$

solution HCF of 175 and 325 = 25

$$\begin{array}{r} 175 \overline{) 325} \\ \underline{-175} \phantom{0} \\ 150 \end{array} \begin{array}{r} 1 \\ 6 \end{array}$$
$$\begin{array}{r} 150 \overline{) 175} \\ \underline{-150} \\ 25 \end{array} \begin{array}{r} 6 \\ 6 \end{array}$$
$$\begin{array}{r} 25 \overline{) 150} \\ \underline{-150} \\ 000 \end{array}$$

$$\Rightarrow \frac{175 \div 25}{325 \div 25} = \frac{7}{13} \quad \text{ans.}$$

solve rest of questions by yourself.

Q.4 Fill in the blanks:

$$(a) \frac{2}{\square} = \frac{32}{48} = \frac{30}{\square}$$

solution The fraction given is shown equivalent so, taking first two terms.

$$\frac{2}{\square} = \frac{32}{48}$$

$$2 \times 48 = 32 \times \square$$

$$96 = 32 \times \square$$

$$\square = \frac{96}{32} = 3$$

$$\frac{2}{\boxed{3}} = \frac{32}{48} = \frac{30}{\square}$$

Now taking first and third terms

$$\frac{2}{3} \rightarrow \frac{30}{\square}$$

$$2 \times \square = 30 \times 3$$

$$2 \times \square = 90$$

$$\square = \frac{90}{2} = 45$$

$$\frac{2}{3} = \frac{30}{45}$$

Hence  $\frac{2}{3} = \frac{32}{48} = \frac{30}{45}$

(b) solve by yourself.

Q.5 Compare the following using  $>$ ,  $<$  or  $=$

(a)  $\frac{2}{5} \square \frac{1}{7}$  (c)  $\frac{7}{14} \square \frac{1}{2}$

Solution - (a)  $\frac{2}{5} \square \frac{1}{7}$

first we find the LCM of their denominators. Then we make the denominator of each fraction equal to the LCM by multiplying with a suitable number.

LCM of 7 and 5 = 35

$$\frac{2}{5} = \frac{2 \times 7}{5 \times 7} = \frac{14}{35}$$

$$\frac{1}{7} = \frac{1 \times 5}{7 \times 5} = \frac{5}{35}$$

$$\frac{14}{35} > \frac{5}{35}$$

$$\frac{2}{5} > \frac{1}{7}$$

(c)  $\frac{7}{14} \square \frac{1}{2}$

L.C.M. of 14 and 2 is 14.

$$\frac{7}{14} = \frac{7 \times 1}{14 \times 1} = \frac{7}{14}$$

$$\frac{1}{2} = \frac{1 \times 7}{2 \times 7} = \frac{7}{14}$$

$$\frac{7}{14} \equiv \frac{7}{14}$$

$$\frac{7}{14} \equiv \frac{1}{2}$$

(b) and (d) solve by yourself as solved above.

Q.6 Arrange the following fractions in ascending order:

$$\frac{1}{3}, \frac{2}{5}, \frac{4}{15}, \frac{3}{10}, \frac{5}{20}, \frac{6}{21}$$

Solution:- L.C.M. of Denominators,

$$3, 5, 15, 10, 20, 21 = 420$$

$$\frac{1}{3} = \frac{1 \times 140}{3 \times 140} = \frac{140}{420}$$

$$\frac{2}{5} = \frac{2 \times 84}{5 \times 84} = \frac{168}{420}$$

$$\frac{4}{15} = \frac{4 \times 28}{15 \times 28} = \frac{112}{420}$$

$$\frac{3}{10} = \frac{3 \times 42}{10 \times 42} = \frac{126}{420}$$

$$\frac{5}{20} = \frac{5 \times 21}{20 \times 21} = \frac{105}{420}$$

$$\frac{6}{21} = \frac{6 \times 20}{21 \times 20} = \frac{120}{420}$$

$$\frac{105}{420} < \frac{112}{420} < \frac{120}{420} < \frac{126}{420} < \frac{140}{420} < \frac{168}{420}$$

$$\frac{5}{20} < \frac{4}{15} < \frac{6}{21} < \frac{3}{10} < \frac{1}{3} < \frac{2}{5}$$

Q.7 solve by yourself as solved Q.6

plz solve (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w) (x) (y) (z)

Q.8 A builder uses  $\frac{2}{5}$  of available land for roads and parks,  $\frac{3}{8}$  for the community hall, and rest in construction of apartments. Which of these gets the maximum portion of the land?

Solution! - To find the rest of portion we need to add the given fractions and their sum should be subtracted from 1.

$$\begin{aligned} \Rightarrow \frac{2}{5} + \frac{3}{8} & \Rightarrow \frac{1 - \frac{31}{40}}{1 - \frac{31}{40}} \\ \Rightarrow \frac{16 + 15}{40} & \Rightarrow \frac{40 - 31}{40} \\ \Rightarrow \frac{31}{40} & \Rightarrow \frac{9}{40} \end{aligned}$$

Portion of the land for construction of apartments =  $\frac{9}{40}$

On comparing  $\frac{2}{5}$ ,  $\frac{3}{8}$  and  $\frac{9}{40}$

L.C.M of 5, 8 and 40 = 40

$$\frac{2}{5} = \frac{2 \times 8}{5 \times 8} = \frac{16}{40}$$

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

$$\frac{16}{40} > \frac{15}{40} > \frac{9}{40}$$

$$\frac{2}{5} > \frac{3}{8} > \frac{9}{40}$$

Hence land for roads and parks got the maximum portion.

Q.9 solve by yourself as solved Q.8

Q.10 Sunita reads  $\frac{3}{5}$  of a book on the first day and  $\frac{1}{3}$  on the second day. On which day did she read more?

Solution:- On comparing taking LCM of 5 and 3

LCM of 5 and 3 is 15.

$$\frac{3}{5} = \frac{3 \times 3}{5 \times 3} = \frac{9}{15}$$

$$\frac{1}{3} = \frac{1 \times 5}{3 \times 5} = \frac{5}{15}$$

$$\frac{9}{15} < \frac{5}{15}$$

$$\frac{3}{5} < \frac{1}{3}$$

she reads more on second day.



$$= \frac{21}{6} + \frac{34}{6} + \frac{8}{6}$$

$$= \frac{21 + 34 + 8}{6} = \frac{63}{6} = 10\frac{1}{2}$$

**Example 10:** Subtract: (a)  $3\frac{1}{2}$  from  $4\frac{3}{4}$  (b)  $8 - 2\frac{5}{12}$

**Solution:** (a)  $4\frac{3}{4} - 3\frac{1}{2} = \frac{19}{4} - \frac{7}{2} = \frac{19 - 14}{4} = \frac{5}{4} = 1\frac{1}{4}$

(b)  $8 - 2\frac{5}{12} = 8 - \frac{29}{12} = \frac{96 - 29}{12} = \frac{67}{12} = 5\frac{7}{12}$

**Example 11:** Subtract  $14\frac{1}{3}$  from the sum of  $10\frac{2}{5}$  and  $4\frac{2}{3}$ .

**Solution:** Add  $10\frac{2}{5} + 4\frac{2}{3}$ .

$$= \frac{52}{5} + \frac{14}{3} \quad (\text{converting mixed fraction into improper fraction})$$

$$= \frac{52 \times 3}{5 \times 3} + \frac{14 \times 5}{3 \times 5} \quad (\text{LCM of 3 and 5} = 15)$$

$$= \frac{156}{15} + \frac{70}{15}$$

$$= \frac{226}{15}$$

According to the question, we get,

$$\frac{226}{15} - 14\frac{1}{3}$$

$$= \frac{226}{15} - \frac{43}{3}$$

$$= \frac{226 - 215}{15} \quad (\text{LCM of 15 and 3} = 15)$$

$$= \frac{11}{15}$$



### Puzzle

In how many ways can  $\frac{7}{12}$  be written as a sum of two fractions in the lowest terms, given that the denominators of the two fractions are different and each is not more than 12? What are these different ways?

## EXERCISE 6.2



1. Add the following numbers:

(a)  $8\frac{3}{8} + 3\frac{3}{8} + 2\frac{3}{8} + \frac{3}{8}$

(b)  $9\frac{7}{8} + 7\frac{5}{24} + 2\frac{1}{16} + 1\frac{3}{4}$

(c)  $5\frac{3}{5} + 2\frac{2}{10} + 3\frac{1}{15} + 4\frac{3}{25}$

(d)  $\frac{5}{8} + 3 + 2\frac{5}{36} + 1\frac{3}{24}$

2. Subtract the following fractions:

(a)  $12 - \frac{3}{5}$

(b)  $\frac{13}{36} - \frac{5}{24}$

(c)  $3\frac{5}{6} - 1\frac{4}{9}$

(d)  $2\frac{7}{11} - 1\frac{5}{33}$

(e)  $11\frac{1}{9} - 5\frac{5}{8}$

(f)  $12 - 4\frac{3}{25} - 1\frac{4}{15}$

3. Simplify the following:

(a)  $3\frac{1}{2} - 1\frac{1}{3} + 5\frac{1}{4}$

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

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

(d)  $5\frac{2}{3} - 2\frac{1}{3} - 1\frac{2}{5}$

(e)  $3\frac{1}{2} - 1 + \frac{2}{5}$

(f)  $2\frac{3}{4} - 11\frac{1}{8} + 9\frac{1}{2}$

4. Subtract the sum of  $13\frac{1}{2}$  and  $6\frac{2}{3}$  from the sum of  $15\frac{1}{2}$  and  $6\frac{3}{4}$ .

5. What should be added to  $12\frac{3}{5}$  to get 20?

6. What should be subtracted from  $20\frac{3}{4}$  to get  $10\frac{1}{2}$ ?

7. Rohit spent  $\frac{2}{5}$  of his pocket money on a science fiction book,  $\frac{1}{6}$  on a newspaper, and  $\frac{2}{15}$  on recreation. What fraction of his pocket money is left?

8. Jaya travels  $\frac{3}{7}$  of his journey by car,  $\frac{4}{21}$  by cycling, and rest on foot. What fraction of his journey was covered on foot?

9. In a boarding school,  $\frac{2}{3}$  of children are in primary section,  $\frac{3}{10}$  are in middle section, and rest are in secondary section. What fraction of children is in secondary section?

10. In a garden,  $\frac{1}{5}$  of the land is used for flowers,  $\frac{2}{7}$  for jogging track, and rest as open land. What fraction is used as open land?

### Points to Remember



- ☞ A fraction is in the simplest form when the HCF of the numerator and denominator is 1.
- ☞ Two or more fractions are said to be equivalent fractions if they represent the same value.
- ☞ Fractions which have the same denominators are called like fractions.
- ☞ When two fractions which have the same denominators are compared, the fraction with the greater numerator will be the greater fraction.
- ☞ When two fractions which have the same numerators are compared, the fraction with the greater denominator will be the smaller fraction.
- ☞ Two fractions which have different numerators and denominators are compared by making the same denominator.

Q.1 Add the following numbers:

$$(a) 8\frac{3}{8} + 3\frac{3}{8} + 2\frac{3}{8} + \frac{3}{8}$$

Solution Convert into improper fractions.

$$8\frac{3}{8} = \frac{8 \times 8 + 3}{8} = \frac{64 + 3}{8} = \frac{67}{8}$$

$$3\frac{3}{8} = \frac{8 \times 3 + 3}{8} = \frac{24 + 3}{8} = \frac{27}{8}$$

$$2\frac{3}{8} = \frac{8 \times 2 + 3}{8} = \frac{16 + 3}{8} = \frac{19}{8}$$

$$= \frac{67}{8} + \frac{27}{8} + \frac{19}{8} + \frac{3}{8}$$

$$= \frac{67 + 27 + 19 + 3}{8}$$

$$= \frac{116}{8}$$

$$\begin{array}{r} 14 \\ 8 \overline{) 116} \\ \underline{-8} \phantom{0} \\ 36 \\ \underline{-32} \\ 04 \end{array}$$

$$= 14\frac{4}{8}$$

$$= 14\frac{1}{2} \quad \underline{\text{ans}}$$

$$(d) \frac{5}{8} + 3 + 2\frac{5}{36} + 1\frac{3}{24}$$

Solution:-  $\frac{5}{8} + 3 + 2\frac{5}{36} + 1\frac{3}{24}$

Convert into like fraction.

$$2\frac{5}{36} = \frac{36 \times 2 + 5}{36} = \frac{72 + 5}{36} = \frac{77}{36}$$

$$1\frac{3}{24} = \frac{24 \times 1 + 3}{24} = \frac{27}{24}$$

$$\frac{5}{8} + 3 + \frac{77}{36} + \frac{27}{24}$$

Lcm of 8, 1, 36 and 24 = 72

$$\frac{5}{8} = \frac{5 \times 9}{8 \times 9} = \frac{45}{72}$$

$$\frac{3}{1} = \frac{3 \times 72}{1 \times 72} = \frac{216}{72}$$

$$\frac{77}{36} = \frac{77 \times 2}{36 \times 2} = \frac{154}{72}$$

$$\frac{27}{24} = \frac{27 \times 3}{24 \times 3} = \frac{81}{72}$$

$$\frac{45}{72} + \frac{216}{72} + \frac{77}{72} + \frac{81}{72}$$

$$\frac{45 + 216 + 154 + 81}{72} = \frac{496}{72}$$

$$\Rightarrow \frac{496}{72}$$

$$= 6 \frac{64}{72}$$

$$= 6 \frac{8}{9} \text{ ans.}$$

$$\begin{array}{r} 6 \\ 72 \overline{) 496} \\ \underline{-432} \\ 64 \end{array}$$

(b) and (c) solve by yourself.

Q2 Subtract the following fractions:

(a)  $12 - \frac{3}{5}$

Sol.

$$\frac{12}{1} - \frac{3}{5}$$

$$\frac{60 - 3}{5} = \frac{57}{5} = 11 \frac{2}{5}$$

(c)  $3 \frac{5}{6} - 1 \frac{4}{9}$

$$\frac{23}{6} - \frac{13}{9}$$

L.C.M. of 6 and 9 = 18

$$\frac{23}{6} = \frac{23 \times 3}{6 \times 3} = \frac{69}{18}$$

$$\frac{13}{9} = \frac{13 \times 2}{9 \times 2} = \frac{26}{18}$$

$$\frac{69}{18} - \frac{26}{18}$$

$$\frac{69 - 26}{18} = \frac{43}{18} = 2 \frac{7}{18}$$

(f)  $12 - 4 \frac{3}{25} - 1 \frac{4}{15}$

Sol.  $12 = 4\frac{3}{25} + 1\frac{4}{15}$

Convert into improper fraction

$$4\frac{3}{25} = \frac{25 \times 4 + 3}{25} = \frac{100 + 3}{25} = \frac{103}{25}$$

$$1\frac{4}{15} = \frac{15 \times 1 + 4}{15} = \frac{19}{15}$$

$$\frac{12}{1} = \frac{103}{25} + \frac{19}{15}$$

L.C.M. of 1, 25, 15 = 150

$$\frac{12}{1} = \frac{12 \times 150}{1 \times 150} = \frac{1800}{150}$$

$$\frac{103}{25} = \frac{103 \times 6}{25 \times 6} = \frac{618}{150}$$

$$\frac{19}{15} = \frac{19 \times 10}{15 \times 10} = \frac{190}{150}$$

$$\frac{1800}{150} - \frac{618}{150} - \frac{190}{150}$$

$$\frac{1800 - 618 - 190}{150}$$

$$\frac{1182 - 190}{150} = \frac{992}{150}$$

$$\Rightarrow \frac{992}{150} = 6\frac{92}{150}$$

$$\Rightarrow 6\frac{46}{75} \text{ ans.}$$

Q.3 Simplify the following:

(a)  $3\frac{1}{2} + 1\frac{1}{3} + 5\frac{1}{4}$

sol. Convert into like fraction.

$$3\frac{1}{2} = \frac{3 \times 2 + 1}{2} = \frac{7}{2}$$

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

$$5\frac{1}{4} = \frac{4 \times 5 + 1}{4} = \frac{21}{4}$$

$$\frac{7}{2} + \frac{4}{3} + \frac{21}{4}$$

L.C.M. of 2, 3, 4 = 12

$$\frac{7}{2} = \frac{7 \times 6}{2 \times 6} = \frac{42}{12}$$

$$\frac{4}{3} = \frac{4 \times 4}{3 \times 4} = \frac{16}{12}$$

$$\frac{21}{4} = \frac{21 \times 3}{4 \times 3} = \frac{63}{12}$$

$$\frac{42}{12} + \frac{16}{12} + \frac{63}{12}$$

$$\frac{42 + 16 + 63}{12} = \frac{121}{12}$$

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

$$= 10\frac{1}{12} = 10\frac{1}{12} \text{ ans.}$$

$$(d) 5\frac{2}{3} - 2\frac{1}{3} - 1\frac{2}{5}$$

Solution:- Convert into like fraction.

$$5\frac{2}{3} = \frac{5 \times 3 + 2}{3} = \frac{15 + 2}{3} = \frac{17}{3}$$

$$2\frac{1}{3} = \frac{2 \times 3 + 1}{3} = \frac{6 + 1}{3} = \frac{7}{3}$$

$$1\frac{2}{5} = \frac{1 \times 5 + 2}{5} = \frac{5 + 2}{5} = \frac{7}{5}$$

$$\Rightarrow \frac{17}{3} - \frac{7}{3} - \frac{7}{5}$$

$$\text{L.C.M of } 3, 3 \text{ and } 5 = 15$$

$$\frac{17}{3} = \frac{17 \times 5}{3 \times 5} = \frac{85}{15}$$

$$\frac{7}{3} = \frac{7 \times 5}{3 \times 5} = \frac{35}{15}$$

$$\frac{7}{5} = \frac{7 \times 3}{5 \times 3} = \frac{21}{15}$$

$$\Rightarrow \frac{85}{15} - \frac{35}{15} - \frac{21}{15}$$

$$\Rightarrow \frac{85 - 35 - 21}{15}$$

$$\Rightarrow \frac{50 - 21}{15}$$

$$\Rightarrow \frac{29}{15} = 1\frac{14}{15} \text{ ans.}$$

Solve rest of questions by yourself.



Q4 subtract the sum of  $13\frac{1}{2}$  and  $6\frac{2}{3}$  from the sum of  $15\frac{1}{2}$  and  $6\frac{3}{4}$ .

Solution:- Sum of  $13\frac{1}{2}$  and  $6\frac{2}{3}$

$$13\frac{1}{2} = \frac{13 \times 2 + 1}{2} = \frac{26 + 1}{2} = \frac{27}{2}$$

$$6\frac{2}{3} = \frac{6 \times 3 + 2}{3} = \frac{18 + 2}{3} = \frac{20}{3}$$

On adding =

$$\frac{27}{2} + \frac{20}{3}$$

L.C.M. of 2 and 3 = 6

$$\frac{27 \times 3}{2 \times 3} = \frac{81}{6}$$

$$\frac{20 \times 2}{3 \times 2} = \frac{40}{6}$$

$$\Rightarrow \frac{81}{6} + \frac{40}{6} = \frac{81 + 40}{6} = \frac{121}{6}$$

Again find the sum of  $15\frac{1}{2}$  and  $6\frac{3}{4}$

$$6\frac{3}{4}$$

$$15\frac{1}{2} = \frac{15 \times 2 + 1}{2} = \frac{30 + 1}{2} = \frac{31}{2}$$

$$6\frac{3}{4} = \frac{6 \times 4 + 3}{4} = \frac{24 + 3}{4} = \frac{27}{4}$$

On adding

$$\Rightarrow \frac{31}{2} + \frac{27}{4}$$

$$\text{L.C.M. of } 2 \text{ and } 4 = 4$$

$$\frac{31}{2} = \frac{31 \times 2}{2 \times 2} = \frac{62}{4}$$

$$\frac{27}{4} = \frac{27 \times 1}{4 \times 1} = \frac{27}{4}$$

$$\Rightarrow \frac{62}{4} + \frac{27}{4}$$

$$\frac{62 + 27}{4} = \frac{89}{4} \quad \text{--- (1)}$$

Now subtract (1) from (2)

$$\Rightarrow \frac{89}{4} - \frac{121}{6}$$

$$\text{L.C.M. of } 4 \text{ and } 6 = 12$$

$$\frac{89}{4} = \frac{89 \times 3}{4 \times 3} = \frac{267}{12}$$

$$\frac{121}{6} = \frac{121 \times 2}{6 \times 2} = \frac{242}{12}$$

$$\Rightarrow \frac{267 - 242}{12} = \frac{267 - 242}{12}$$

$$\Rightarrow \frac{25}{12} = 2 \frac{1}{12} \quad \text{Ans.}$$

Q.5 What should be added to  $12\frac{3}{5}$  to get 20?

Sol. Let the unknown number be  $x$ .  
According to question

$$12\frac{3}{5} + x = 20$$

Convert into improper fraction.

$$12\frac{3}{5} = \frac{12 \times 5 + 3}{5} = \frac{60 + 3}{5} = \frac{63}{5}$$

$$\Rightarrow \frac{63}{5} + x = 20$$

$$\Rightarrow x = \frac{20}{1} - \frac{63}{5}$$

$$\Rightarrow x = \frac{100 - 63}{5}$$

$$\Rightarrow x = \frac{37}{5} = 7\frac{2}{5} = 7\frac{2}{5}$$

$\therefore$  we should add  $7\frac{2}{5}$  to  $12\frac{3}{5}$  to get 20.

Q.6 solve by yourself as solved Q.5.

Q.7 Rohit spent  $\frac{2}{5}$  of his pocket money on a science fiction book,  $\frac{1}{6}$  on a newspaper and  $\frac{2}{15}$  on recreation, what fraction of his pocket money is left?

Solution:- To find the money left with him we need to add the given fractions and their sum should be subtracted by from 1.

$$\text{He spent on book} = \frac{2}{5}$$

$$\text{He spent on newspaper} = \frac{1}{6}$$

$$\text{He spent on Recreation} = \frac{2}{15}$$

$$\text{Total money he spent} = \frac{2}{5} + \frac{1}{6} + \frac{2}{15}$$

$$\text{LCM of } 5, 6 \text{ and } 15 = 30$$

$$\frac{2}{5} = \frac{2 \times 6}{5 \times 6} = \frac{12}{30}$$

$$\frac{1}{6} = \frac{1 \times 5}{6 \times 5} = \frac{5}{30}$$

$$\frac{2}{15} = \frac{2 \times 2}{15 \times 2} = \frac{4}{30}$$

$$\Rightarrow \frac{12}{30} + \frac{5}{30} + \frac{4}{30}$$

$$\Rightarrow \frac{12 + 5 + 4}{30}$$

$$\Rightarrow \frac{21}{30}$$

now let's subtract from 1.

$$\Rightarrow 1 - \frac{21}{30}$$

$$\Rightarrow \frac{30 - 21}{30} = \frac{9}{30} = \frac{3}{10}$$

$\frac{3}{10}$  of his pocket money is left with him.

Q. 8, 9 and 10 are same as Q. 7 so do them by yourself