9 Fractions

By studying this chapter you will be able to get a good understanding of,

- ✶ comparison of fractions
- ✶ coversion of vulgar fractions into decimals and vice versa (conversions of decimals into vulgar fractions)
- ✶ identification of mixed numbers
- ✶ identification of improper fractions
- ✶ addition of fractions
- ✶ subtraction of fractions
- ✶ solving problems related to fractions

We know that a fraction is a part of a whole.

Activity 9. 1

$\frac{1}{12}$, $\frac{3}{4}$, $\frac{1}{4}$, $\frac{3}{5}$, $\frac{4}{8}$

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

$\frac{5}{7}$, $\frac{2}{4}$, $\frac{5}{6}$, $\frac{9}{11}$, $\frac{3}{9}$, $\frac{5}{11}$

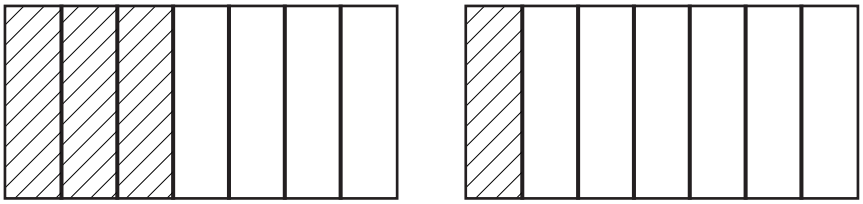
Observe the fractions given here.

- There are fractions with one as numerator.
- There are equivalent fractions.
- In all of these fractions the numerator is less than denominator.

- Fractions with numerator equal to 1 are called **unit fractions.**
- Fractions of which the numeractor is less than the denominator are called **proper fractions.**
- A fraction equal in value to a certain other fraction and its numerator and denominator are the multiples of the latter are called **equivalent fractions.**

9.1 Comparison of fractions

(A) **Comparison of fractions with equal denominators.**



$\frac{3}{7}$ $\frac{1}{7}$

According to the above figures, it is seen that $\frac{3}{7}$ is greater than $\frac{1}{7}$.

We can express it as $\frac{3}{7} > \frac{1}{7}$.
These fractions are fractions with equal denominators.

(B) comparison of fractions with unequal denominators.

$\frac{3}{5}$ $\frac{7}{10}$

According to the above figures, it can be seen that $\frac{3}{5}$ is less than $\frac{7}{10}$.

that is $\frac{3}{5} < \frac{7}{10}$.

In these the denominators are unequal, but 10, the denominator of the second fraction is a multiple of 5, the denominator of the first fraction. Such denominators are called related denominators.

$\frac{3}{5} = \frac{3 \times 2}{5 \times 2} = \frac{6}{10}$ (Using the knowledge of equivalent fractions.)

$\therefore \frac{6}{10} < \frac{7}{10}$

Hence $\frac{3}{5} < \frac{7}{10}$

Activity 9.2

Copy the table given below. Complete the second column of the table by pairing the given fractions in the first column. Complete the third column by relating the pairs of fractions you wrote in the second coloumn as < or >.

Fraction	Pairs	Comparison
$\frac{3}{5}, \frac{4}{5}, \frac{2}{5}$	$\frac{3}{5}, \frac{4}{5}$ $\frac{4}{5}, \frac{2}{5}$ $\frac{3}{5}, \frac{2}{5}$	$\frac{3}{5} < \frac{4}{5}$ $\frac{4}{5}$ ..... $\frac{2}{5}$ .....
$\frac{1}{4}, \frac{3}{8}, \frac{3}{4}$	$\frac{1}{4}, \frac{3}{8}$	....
$\frac{2}{3}, \frac{1}{6}, \frac{5}{12}$	....	....

- When comparing fractions with equal denominators the largest fraction can be decided according to the magnitude of the numerator.
- When comparing fractions with related denominators they must be converted to fractions with equal denominators. After that the largest fraction can be decided on the magnitude of the numerator.

(C) Comparison of fractions with unrelated denominators

Activity 9.3

Copy the table given below into your exercise book. By writing equivalent fractions to the fractions in the first column identify the fractions with equal denominators, of the second column. Accordingly complete the third column comparing the given pairs of fractions.

Pair of fractions to be compared	Writing equivalent fractions	Comparison
$\frac{1}{3}$ and $\frac{1}{2}$	$\frac{1}{3} = \frac{2}{6} = \frac{3}{9}$ $\frac{1}{2} = \frac{2}{4} = \frac{\square}{\square}$	As $\frac{3}{6} > \frac{2}{6}$ it is $\frac{1}{2} > \frac{1}{3}$.
$\frac{2}{3}$ and $\frac{3}{4}$	$\frac{2}{3} = \frac{4}{\square} = \frac{\square}{9} = \frac{\square}{12}$ $\frac{3}{4} = \frac{6}{8} = \frac{9}{\square}$	As $\frac{\square}{\square} > \frac{8}{12}$ it is $\frac{\square}{\square} > \frac{\square}{\square}$.
$\frac{2}{3}$ and $\frac{3}{5}$	$\frac{2}{3} = \frac{4}{6} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$ $\frac{3}{5} = \frac{\square}{10} = \frac{\square}{\square}$	As $\frac{\square}{\square} > \frac{\square}{\square}$ it is $\frac{\square}{\square} > \frac{\square}{\square}$.

Exercise 9.1

(1) Select and write the greatest fraction among each set of fractions given below.

(i) $\frac{5}{8}, \frac{3}{8}, \frac{7}{8}$

(ii) $\frac{3}{7}, \frac{1}{7}, \frac{2}{7}$

(iii) $\frac{5}{11}, \frac{2}{11}, \frac{3}{11}$

(iv) $\frac{5}{7}, \frac{3}{7}, \frac{4}{7}$

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

(vi) $\frac{5}{13}, \frac{9}{13}, \frac{7}{13}$

(2) Select the greatest fraction in each set of fractions given below.

(i) $\frac{1}{4}, \frac{1}{3}$ (iii) $\frac{3}{5}, \frac{5}{7}$ (v) $\frac{3}{5}, \frac{2}{3}$ (vii) $\frac{1}{2}, \frac{1}{3}, \frac{2}{5}$

(ii) $\frac{1}{4}, \frac{2}{5}$ (iv) $\frac{5}{6}, \frac{2}{9}$ (vi) $\frac{1}{2}, \frac{5}{7}$ (viii) $\frac{3}{4}, \frac{2}{3}, \frac{1}{2}$

(3) Kamal and Nimal bought two bottles of soft drinks of the same size. Kamal drank $\frac{3}{5}$ of the contents of his bottle and Nimal drank $\frac{2}{3}$ contents of his bottle. Who drank the greater quantity of soft drinks?

(4) Heshan and Kalpa are two workers who get equal monthly salaries. Heshan had saved $\frac{2}{5}$ of his last month's salary, while Kalpa had saved $\frac{3}{4}$ of his salary. Who have saved more money?

(5) The table given below shows the number of questions for which correct answers were given by Dileepa in three Mathematics evaluations.

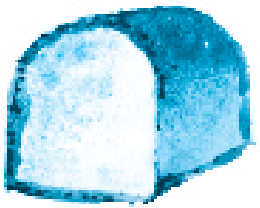
	Numbers of questions given	Number of correct answers	Number of correct answers as a fraction
evaluation 1	6	5	$\frac{5}{6}$
evaluation 2	20	15	$\frac{15}{20}$
evaluation 3	10	7	$\frac{7}{10}$

Using this information express how you would explain, to him how he has gradually decreased his level of performance in Mathematics.

9.2 Mixed numbers

Nipuna's mother had asked him to bring a loaf of bread and a half.

✶ Bread Nipuna brought



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

1 + is equal to $\frac{1}{2}$

Here we have a whole number 1 and a fraction .

We can write it as $1\frac{1}{2}$. This is a mixed number.

Accordingly $2\frac{1}{4}$, $1\frac{1}{5}$, $5\frac{3}{4}$, are mixed numbers.

A whole number with a fraction is called a mixed number.

(A) Conversion of mixed numbers to improper fractions

Pay attention to the examples given below.

$1\frac{1}{2}$	$2\frac{1}{3}$	$3\frac{1}{4}$
$= 1 + \frac{1}{2}$	$= 2 + \frac{1}{3}$	$= 3 + \frac{1}{4}$
$= \frac{2}{2} + \frac{1}{2}$	$= 1 + 1 + \frac{1}{3}$	$= 1 + 1 + 1 + \frac{1}{4}$
$= \frac{3}{2}$	$= \frac{3}{3} + \frac{3}{3} + \frac{1}{3}$	$= \frac{4}{4} + \frac{4}{4} + \frac{4}{4} + \frac{1}{4}$
	$= \frac{7}{3}$	$= \frac{13}{4}$

$\frac{3}{2}$ $\frac{7}{3}$ $\frac{13}{4}$

Her When a fraction has a numerator larger than the denominator, it is called an improper fraction.

Now let us learn another method of writing mixed numbers, as improper fractions.

$1\frac{1}{2} = \frac{(1 \times 2)+1}{2} = \frac{2+1}{2} = \frac{3}{2}$

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

$3\frac{3}{4} = \frac{(3 \times 4)+3}{4} = \frac{12+3}{4} = \frac{15}{4}$

By multiplying the whole number of the mixed number by the denominator of the fraction and by adding the numerator to the result of the multiplication the numerator of the improper fraction can be obtained. Its denominator is the same denominator as of the mixed number.

Example 1

Complete the blanks in the table given below.

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

(B) Writing improper fractions as mixed numbers

See the examples given below.

Example 2

(i)

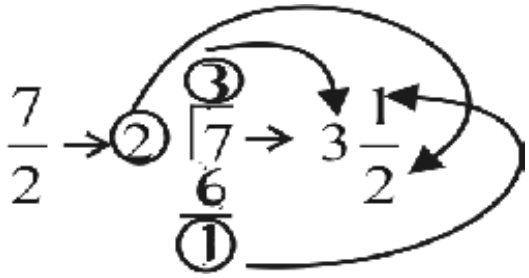
$$\frac{7}{2} = \frac{2+2+2+1}{2}$$
$$= \frac{2}{2}+\frac{2}{2}+\frac{2}{2}+\frac{1}{2}$$
$$= 1+1+1+\frac{1}{2}$$
$$= 3+\frac{1}{2}$$
$$= 3\frac{1}{2}$$

(ii)

$$\frac{17}{3} = \frac{3+3+3+3+3+2}{3}$$
$$= \frac{3}{3}+\frac{3}{3}+\frac{3}{3}+\frac{3}{3}+\frac{3}{3}+\frac{2}{3}$$
$$= 1+1+1+1+1+\frac{2}{3}$$
$$= 5+\frac{2}{3}$$
$$= 5\frac{2}{3}$$

This can also be obtained as shown below.

(i)



(ii) $\frac{17}{3} \rightarrow 3\overline{)17}\ \begin{matrix}5\\15\\02\end{matrix} \rightarrow 5\frac{2}{3}$

Activity 9. 4

Fill the blanks in the table given below

$\frac{8}{5}$	$5\overline{)8}\ \begin{matrix}1\\5\\3\end{matrix}$	$1\frac{\square}{5}$
$\frac{21}{4}$	$4\overline{)21}\ \begin{matrix}5\\20\\1\end{matrix}$	$5\frac{1}{\square}$
$\frac{25}{7}$	$\square\overline{)25}\ \begin{matrix}3\\\square\\\square\end{matrix}$	.....

(c) Comparison of mixed numbers

Example 3

Comparison of mixed numbers can also be done in the same way comparison of vulgar fractions was done. $3\frac{1}{5}$ $4\frac{1}{2}$

Let us find the larger mixed number out of and .

First, examine the whole numbers of the two given mixed numbers.

If these two whole numbers are unequal, then the mixed number which has the greater whole number in value is the greater mixed number.

So when we consider the whole numbers $\textcircled{3}\ \frac{1}{5}$ and $\textcircled{4}\ \frac{1}{2}$.
4 is greater than 3.

Therefore $4\frac{1}{2} > 3\frac{1}{5}$

Let us consider another example.

Example 4

Find what the larger number is out of $4\frac{3}{5}$ and $4\frac{2}{3}$.

Here whole numbers of the two given mixed numbers are equal.
Then the mixed number which has the greater fraction is the larger mixed number.

Accordingly let us find the greater fraction out of $\frac{3}{5}$ and $\frac{2}{3}$ of the mixed numbers, $4\frac{3}{5}$ and $4\frac{2}{3}$.

According to the way you compared fractions using equivalent fractions,

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

$$\frac{2}{3} \times \frac{5}{5} = \frac{10}{15}$$

since $\frac{10}{15} > \frac{9}{15}$

$\frac{2}{3} > \frac{3}{5}$ $\quad \therefore 4\frac{2}{3} > 4\frac{3}{5}$

Comparison of mixed numbers can also be done by the method shown on the next page.

Let us consider the example 4 again. The mixed numbers should be converted into improper fractions first.

$$4\frac{3}{5} \rightarrow \frac{23}{5}$$

$$4\frac{2}{3} \rightarrow \frac{14}{3}$$

Now by comparing the improper fractions obtained, the two mixed numbers can be compared. Let us use the knowledge of equivalent fraction here.

$$\frac{23}{5} \times \frac{3}{3} = \frac{69}{15}$$

$$\frac{14}{3} \times \frac{5}{5} = \frac{70}{15}$$

$$\frac{70}{15} > \frac{69}{15}$$

We have the result,

$$\frac{14}{3} > \frac{23}{5}$$

Therefore

$$\therefore\ 4\frac{2}{3} > 4\frac{3}{5}$$

★ You can use the easier method to compare mixed numbers.

Exersice 9. 2

(1) Convert the given mixed numbers into improper fractions by filling the cages.

(i) $2\frac{3}{5}$

$= \square + \square + \frac{3}{5}$

$= \frac{\square}{5} + \frac{\square}{5} + \frac{3}{5}$

$= \frac{\square}{5}$

(ii) $4\frac{2}{3}$

$= \square + \square + \square + \square + \frac{2}{3}$

$= \frac{\square}{3} + \frac{\square}{3} + \frac{\square}{3} + \frac{\square}{3} + \frac{2}{3}$

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

(iii) $2\frac{1}{5}$

$= \frac{(2 \times 5) + 1}{5}$

$= \frac{\square + \square}{5}$

$= \frac{\square}{5}$

(iv) $7\frac{2}{3}$

$= \frac{([\ ] \times [\ ]) + 2}{3}$

$= \frac{\square + \square}{3}$

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

(2) Convert the mixed numbers given below into improper fractions.

(i) $8\frac{3}{5}$ (ii) $7\frac{2}{3}$ (iii) $6\frac{4}{5}$ (iv) $5\frac{5}{6}$ (v) $2\frac{3}{7}$ (vi) $7\frac{1}{4}$

(3) Convert the given improper fractions into mixed numbers by filling the cages.

(i) $\frac{8}{5}$

$= \frac{5}{5} + \frac{\square}{5}$

$= 1 + \frac{\square}{5}$

$= 1\frac{\square}{5}$

(ii) $\frac{10}{7}$

$= \frac{\square}{\square} + \frac{3}{7}$

$= \square + \frac{3}{7}$

$= \square\ \frac{3}{7}$

(iii) $\frac{12}{5}$

$= \frac{5}{5} + \frac{5}{5} + \frac{\square}{5}$

$= 1 + 1 + \frac{\square}{5}$

$= 2 + \frac{\square}{5}$

$= 2\frac{\square}{5}$

(iv) $\frac{15}{7}$

$= \frac{\square}{7} + \frac{\square}{7} + \frac{1}{7}$

$= \square\frac{1}{7}$

(v) $\frac{27}{8}$

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

$= \square\frac{\square}{8}$

(vi) $\frac{8}{3}$

$= 3\overline{)\begin{array}{r}\square\\ 8\\ 6\end{array}}$

$\square$

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

(vii) $\frac{19}{5}$

$= \square\overline{)\begin{array}{r}\square\\ 19\\ 15\end{array}}$

$\square$

$= \square\frac{\square}{5}$

(viii) $\frac{17}{4}$

$= \square\overline{)\begin{array}{r}\square\\ 17\\ \square\end{array}}$

$\square$

$= \square\frac{\square}{4}$

(4) Write the improper fractions given below as mixed numbers .

(i) $\frac{9}{5}$ (ii) $\frac{13}{7}$ (iii) $\frac{15}{4}$ (iv) $\frac{18}{5}$ (v) $\frac{13}{7}$

(vi) $\frac{27}{6}$ (vii) $\frac{32}{5}$

(5) Compare each pairs of mixed numbers given below.

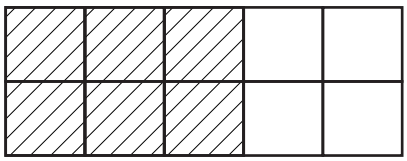
(i) $3\frac{1}{5}$, $7\frac{3}{4}$ (ii) $4\frac{2}{5}$, $4\frac{4}{7}$

(iii) $8\frac{2}{3}$, $6\frac{2}{9}$ (iv) $7\frac{3}{5}$, $7\frac{5}{7}$ (v) $9\frac{6}{7}$, $9\frac{3}{4}$

Let us recollect of what we learnt about decimals in Grade 6.

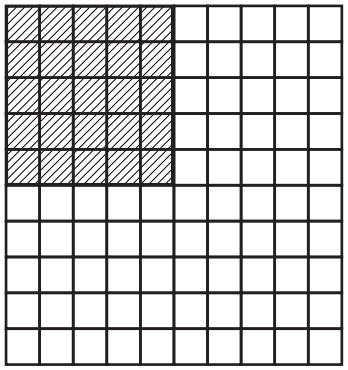
9.3 Conversion of Vulgar Fractions into Decimals

We can write $\frac{2}{10}$ as 0.2.



$\frac{6}{10}$

We can write as 0.6 .



$\frac{1}{4}$ $\frac{25}{100}$

Hence $\frac{1}{10} = 0.1$

$\frac{7}{10} = 0.7$

$\frac{18}{100} = 0.18$

We can write $\frac{5}{100} = 0.05$.

Now you have learnt, how to write fractions with denominators of 10 or 100 as decimals.

Now let us convert fractions with denominators, not equal to10 or 100 into decimals.

Example 5

(i) $\frac{3}{5} = \frac{3 \times 2}{5 \times 2} = \frac{6}{10} = 0.6$

(ii) $\frac{1}{2} = \frac{1 \times 5}{2 \times 5} = \frac{5}{10} = 0.5$

(iii) $\frac{8}{50} = \frac{8 \times 2}{50 \times 2} = \frac{16}{100} = 0.16$

(iv) $\frac{3}{25} = \frac{3 \times 4}{25 \times 4} = \frac{12}{100} = 0.12$

Activity 9.5

Fill in the blanks.

(i) $\frac{3}{4} = \frac{3 \times 25}{4 \times 25} = \frac{\square}{100} = ...$

(ii) $\frac{2}{5} = \frac{2 \times \square}{5 \times \square} = \frac{\square}{10} = ...$

(iii) $\frac{7}{20} = \frac{7 \times \square}{20 \times \square} = \frac{\square}{\square} = ...$

Example 6

Express $\frac{5}{8}$ as a decimal.

$$\frac{5}{8} = \frac{5 \times 125}{8 \times 125}$$
$$= \frac{625}{1000}$$
$$= \underline{\underline{0.625}}$$

We can convert fractions with denominators not equal to 10, 100, 1000, ... or powers of 10 into decimals. You can learn it in a future lesson.

Exercise 9.3

(1) Convert the fractions given below into decimals. $\frac{1}{10}$ $\frac{5}{10}$ $\frac{9}{10}$ $\frac{8}{10}$ $\frac{27}{100}$

(i) $\frac{48}{100}$ (ii) $\frac{75}{100}$ (iii) $\frac{4}{100}$ (iv) $\frac{7}{100}$ (v) $\frac{9}{100}$

(vi) (vii) (viii) (ix) (x)

(2) Convert the fractions given below into decimals, by filling the blanks.

$$\frac{1}{5} = \frac{1 \times \square}{5 \times \square} = \frac{\square}{\square} = 0. \ldots\ldots$$

(i)

$$\frac{27}{50} = \frac{27 \times \square}{50 \times \square} = \frac{\square}{\square} = 0. \ldots\ldots$$

(ii)

$$\frac{13}{25} = \frac{13 \times \square}{25 \times \square} = \frac{\square}{\square} = 0. \ldots\ldots$$

(iii)

(3) Using the method of division, convert the fractions given below into decimals.

(i) $\frac{1}{2}$ (ii) $\frac{3}{5}$ (iii) $\frac{3}{8}$ (iv) $\frac{3}{20}$ (v) $\frac{7}{25}$ (vi) $\frac{4}{50}$

Exploration

Explore different methods to convert $\frac{28}{40}$ into a decimal.

9.4 Writing Decimals as Fractions.

$\frac{3}{10} = 0.3 \rightleftharpoons 0.3 = \frac{3}{10}$

$\frac{5}{10} = 0.5 \rightleftharpoons 0.5 = \frac{5}{10}$

$\frac{18}{100} = 0.18 \rightleftharpoons 0.18 = \frac{18}{100}$

Activity 9.6

Complete the table given below.

Fraction	Decimal
$\frac{2}{10}$	0. ....
$\frac{1}{10}$	....
$\frac{16}{100}$	....
$\frac{28}{100}$	....

Decimal	Fraction
0.4	$\frac{....}{10}$
0.6	....
0.17	....
	....

Exercise 9.4

(1) Convert the decimals given below into fractions.

(i) 0.9 (ii) 0.8 (iii) 0.25 (iv) 0.75 (v) 0.36
(vi) 0.53 (vii) 0.07 (viii) 0.08 (ix) 0.85 (x) 0.99

(2) Chathura said that he drank $\frac{3}{5}$ parts of a bottle of soft drinks. Dayani also said that, she drank a share of 0.7 of a bottle of soft drinks of the same size. Who drank the larger share of soft drinks?

(3) Out of a cake that a father brought, the son ate $\frac{1}{4}$ and the daughter ate a share equal to 0.3 of the same cake. Who ate the lesser share of the cake?

(4) A mother used 0.15 of water in a tank for bathing. The father used $\frac{13}{100}$ of water in the same tank for bathing. Who used the larger quantity of water?

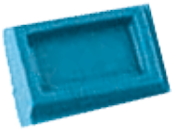
9.5 Addition and Subtraction of Fractions

(A) Addition of fractions

A slab of chocolate which is divided into 10 equal parts is shown in the figure.

How some parts of it was divided between two children is given below.

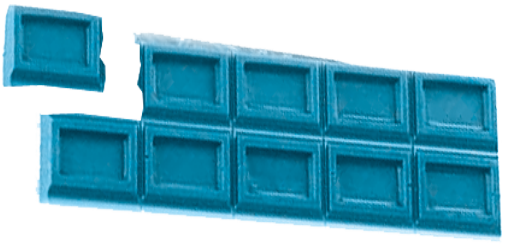
Sunil



Ramesh

Let us find what fractions separately of the whole chocolate did Sunil and Ramesh recieve.

Sunil → $\frac{1}{10}$

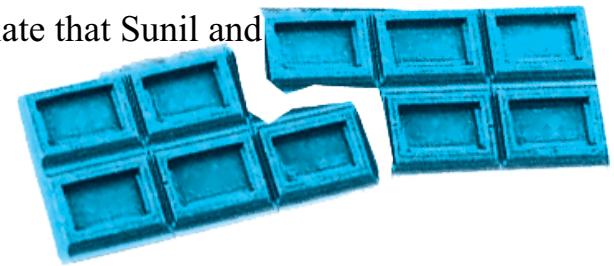


Ramesh → $\frac{4}{10}$

The fraction of the chocolate that Sunil and $\frac{5}{10}$.

That is,

$$\frac{1}{10} + \frac{4}{10} = \frac{5}{10}$$



Activity 9.7

Fill in the blanks of the table given below.

$\frac{5}{9} + \frac{2}{9}$ $= \frac{5+.....}{9}$ $= \frac{.....}{9}$	$\frac{3}{11} + \frac{5}{11}$ $= \frac{..... + ...}{11}$ $= \frac{.....}{.....}$	$\frac{3}{12} + \frac{1}{12} + \frac{5}{12}$ $= \frac{.... + ... + ...}{12}$ $= \frac{.....}{12}$

Activity 9.8

F

$\frac{1}{3} + \frac{1}{2}$ $= \frac{1\times2}{3\times2} + \frac{1\times3}{2\times3}$ $= \frac{2}{6} + \frac{.....}{6}$ $= \frac{2+.....}{6}$ $= \frac{.....}{6}$	$\frac{2}{5} + \frac{1}{3}$ $= \frac{2\times3}{5\times3} + \frac{1\times5}{3\times5}$ $= \frac{.....}{15} + \frac{.....}{.....}$ $= \frac{..... + ...}{15}$ $= \frac{.....}{.....}$	$\frac{2}{3} + \frac{1}{12}$ $= \frac{.....\times.....}{3\times4} + \frac{1\times .....}{12\times1}$ $= \frac{.....}{12} + \frac{1}{12}$ $= \frac{..... + ...}{.....}$ $= \frac{.....}{.....}$

Activity 9.9

(B) Subtracting Fractions

(i)

$\frac{3}{5} - \frac{1}{5}$ $= \frac{3-...}{5}$ $= \frac{...}{5}$	$\frac{8}{13} - \frac{2}{13}$ $= \frac{...-...}{13}$ $= \frac{...}{...}$	$\frac{14}{17} - \frac{9}{17}$ $= \frac{...-...}{...}$ $= \frac{...}{...}$

(ii) Write suitable numbers for the blanks in each of the following.

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

$= \frac{2\times4}{3\times4} - \frac{1\times3}{4\times3}$

$= \frac{\ldots}{12} - \frac{3}{12}$

$= \frac{\ldots}{12}$

(ii) $\frac{3}{4} - \frac{1}{6}$

$= \frac{3\times3}{4\times3} - \frac{1\times2}{6\times2}$

$= \frac{9}{12} - \frac{\ldots}{12}$

$= \frac{\ldots}{12}$

(iii) $\frac{7}{12} - \frac{1}{3}$

$= \frac{7}{12} - \frac{1\times\ldots}{3\times4}$

$= \frac{7-\ldots}{12}$

$= \frac{\ldots}{\ldots}$

Exercise 9.5

(1) Add each set of fractions given below.

(i) $\frac{1}{5} + \frac{2}{5} + \frac{1}{5}$

(ii) $\frac{2}{7} + \frac{1}{7} + \frac{3}{7}$

(iii) $\frac{5}{11} + \frac{3}{11} + \frac{1}{11}$

(iv) $\frac{5}{11} + \frac{6}{11}$

(v) $\frac{3}{7} + \frac{4}{7}$

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

(vii) $\frac{1}{6} + \frac{1}{3} + \frac{5}{12}$

(viii) $\frac{1}{2} + \frac{1}{4} + \frac{3}{8}$

(2) Simplify.

(i) $\frac{1}{4} + \frac{3}{8}$

(ii) $\frac{2}{7} + \frac{3}{14}$

(iii) $\frac{7}{8} - \frac{2}{5}$

(iv) $\frac{9}{10} + \frac{5}{6}$

(v) $\frac{2}{5} - \frac{1}{6}$

(vi) $\frac{5}{8} - \frac{1}{2}$

(vii) $\frac{5}{6} - \frac{1}{3}$

(viii) $\frac{7}{12} - \frac{1}{3}$

(ix) $\frac{4}{5} + \frac{11}{15}$

(3) Simplify.

(i) $\frac{1}{5} + \frac{1}{2}$ (iv) $\frac{1}{3} + \frac{5}{12}$

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

(iii) $\frac{2}{7} + \frac{5}{14}$ (vi) $\frac{2}{5} + \frac{1}{3}$

(4) Simplify and give the results in the simplest form.

(i) $\frac{5}{12} - \frac{4}{15}$ (ii) $\frac{7}{10} + \frac{5}{12}$ (iii) $\frac{6}{7} - \frac{5}{6}$

(iv) $\frac{5}{9} + \frac{3}{8}$ (v) $\frac{11}{10} - \frac{3}{5}$ (vi) $\frac{9}{48} - \frac{1}{16}$

(5) Simplify.

(i) $\frac{8}{15} - \frac{7}{15}$ (iii) $\frac{9}{11} - \frac{5}{11}$ (v) $\frac{7}{8} - \frac{5}{8}$

(ii) $\frac{7}{10} - \frac{3}{10}$ (iv) $\frac{3}{4} - \frac{1}{4}$ (vi) $\frac{5}{6} - \frac{1}{6}$

(i) $\frac{3}{4} - \frac{1}{2}$ (v) $\frac{2}{3} - \frac{5}{12}$ (viii) $\frac{3}{5} - \frac{3}{10}$

(ii) $\frac{5}{6} - \frac{1}{3}$ (vi) $\frac{5}{7} - \frac{5}{14}$ (ix) $\frac{2}{3} - \frac{3}{5}$

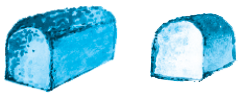
(iii) $\frac{2}{3} - \frac{1}{4}$ (vii) $\frac{5}{6} - \frac{3}{4}$ (x) $\frac{4}{5} - \frac{3}{8}$

(iv) $\frac{5}{6} - \frac{2}{9}$

9.6 Addition and Subtraction of Mixed Numbers

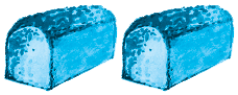
Example 7

Chanaka's mother asked Chanaka to bring $1\frac{1}{2}$ loaves of bread for their dinner. Without knowing that, Chanaka's father also, had brought $2\frac{1}{4}$ loaves of bread. Find the total quantity of bread in their house.

Quantity of bread that Chanaka brought =  = $1\frac{1}{2}$

Quantity of bread that father had brought =  = $2\frac{1}{4}$

Quantity of bread brought by both of them.

= ( ) + ()

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

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

Number of complete loaves of bread + Parts of loaves of bread

(  ) + ( )

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

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

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

$= 3\frac{3}{4}$

Example 8

(i) $3\frac{1}{7} + 2\frac{3}{7}$

$= (3 + 2) + (\frac{1}{7} + \frac{3}{7})$

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

$= \underline{\underline{5\ \frac{4}{7}}}$

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

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

$= 3 + \left(\frac{2\times4}{3\times4} + \frac{1\times3}{4\times3}\right)$

$= 3 + \frac{8}{12} + \frac{3}{12}$

$= 3 + \frac{11}{12}$

$= \underline{\underline{3\frac{11}{12}}}$

We can also add mixed number by the method given below.

Let us consider the simplification of $3\frac{1}{7} + 2\frac{3}{7}$.

Here, The mixed numbers can be converted to improper fractions first.

$$3\frac{1}{7} \rightarrow \frac{22}{7}$$
$$2\frac{3}{7} \rightarrow \frac{17}{7}$$

Now addition of these resulting improper fractions can be done as in the way addition of common fractions was done.

$$\frac{22}{7} + \frac{17}{7} = \frac{22 + 17}{7} = \frac{39}{7} = 5\frac{4}{7}$$

Using this method try to solve the earlier examples which were

Example 9

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

$= (4-2) + \left(\frac{3}{5} - \frac{1}{5}\right)$

$= 2 + \frac{2}{5}$

$= 2\frac{2}{5}$

(ii) $7\frac{2}{3} - 5\frac{1}{4}$

$= (7 - 5) + \left(\frac{2}{3} - \frac{1}{4}\right)$

$= 2 + \left(\frac{8}{12} - \frac{3}{12}\right)$

$= 2 + \frac{5}{12}$

$= 2\frac{5}{12}$

Subtraction of mixed numbers can also be done using improper fractions.

Let us find the value of $4\frac{3}{5} - 2\frac{1}{5}$.

First let us convert mixed numbers into improper fractions.

$4\frac{3}{5} \rightarrow \frac{23}{5}$

$2\frac{1}{5} \rightarrow \frac{11}{5}$

Now let us use the method of subtraction of vulgar fractions.

$$\frac{23}{5} - \frac{11}{5} = \frac{23 - 11}{5} = \frac{12}{5} = 2\frac{2}{5}$$

Exercise 9. 6

(1) A father gave $\frac{3}{8}$ of a block of his land to his son and $\frac{1}{3}$ of it to his daughter.
(i) Find the total area of land that both received.
(ii) Who received the greater share?
(iii) What fraction of the whole land is the above extra share?

(2) Simplify the mixed numbers given below.

(i) $3\frac{1}{4} + 2\frac{5}{12}$ (ii) $4\frac{5}{12} - 2\frac{2}{6}$ (iii) $5\frac{1}{8} + 2\frac{5}{8}$

(iv) $5\frac{1}{4} - 2\frac{1}{2}$ (v) $1\frac{3}{6} + 3\frac{2}{12}$ (vi) $3\frac{1}{3} - 2\frac{1}{4}$

(vii) $4\frac{1}{6} + 2\frac{1}{4}$ (viii) $5\frac{1}{2} - 3\frac{1}{5}$ (ix) $3\frac{2}{9} + 1\frac{1}{3}$

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

Summary

- When comparing common fractions, the knowledge of equivalent fractions is applied.
- By expressing mixed numbers as improper fractions, simplification of fractions can be made easily.
- By dividing the numerator of a fraction by the denominator and by converting the denominator to a multiple of 10; a fraction can be converted to a decimal.
- The knowledge of simplification of fractions can be applied in various situations.