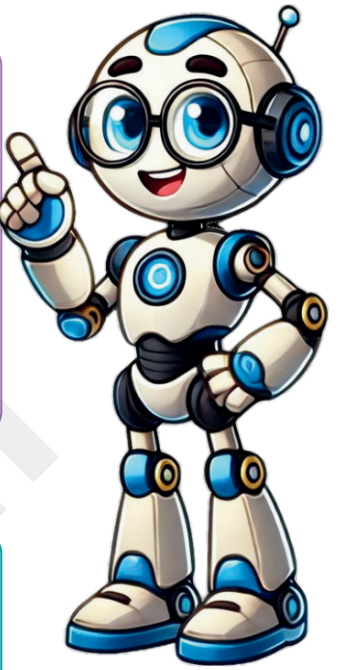
7

Fractions

We'll cover the following key points:

- → Introduction to Fraction
- → Types of Fractions
- → Proper Fractions and Improper Fractions
- → Addition and Subtraction of Like Fractions
- → Word Problems on Fractions



Hi, I'm EeeBee

Still curious? Talk to me by scanning the QR code.

Do you Remember fundamental concept in previous class:
In class 3rd we learnt

- → Basic Concept of Fraction
- → Types of fraction
- → Equivalent Fraction
- → Ordering of Fractional Numbers

Learning Outcomes

By the end of this chapter, students will be able to:

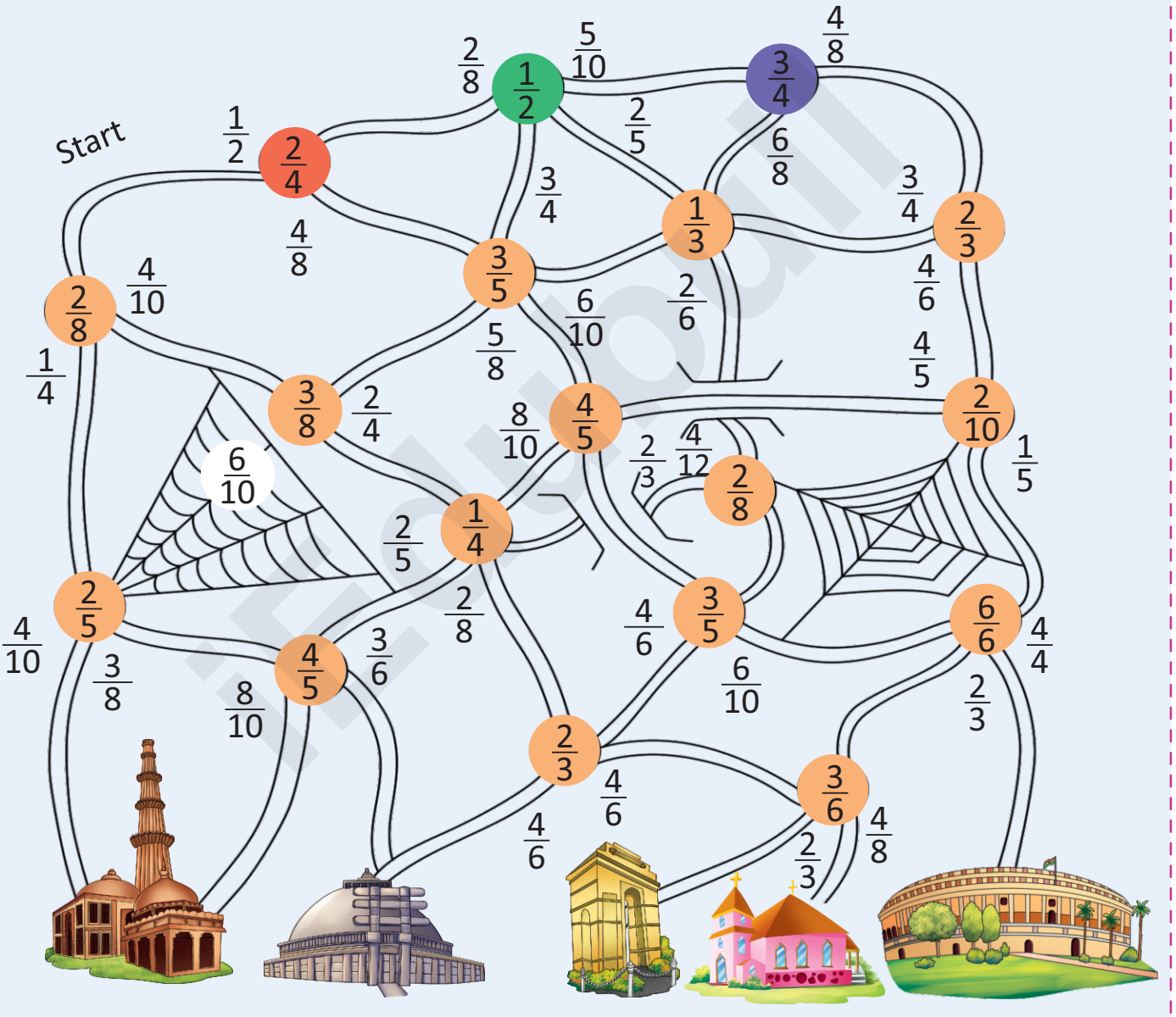
- Understand what a fraction is (e.g., 1/2, 1/4, 3/5) and how it represents parts of a whole.
- Identify the numerator (top number) and denominator (bottom number) in a fraction (e.g., in 3/4, 3 is the numerator, 4 is the denominator).
- Compare fractions with the same denominator (e.g., 3/8 is greater than 2/8).
- Recognize and understand equivalent fractions (e.g., 1/2 is the same as 2/4 or 4/8).
- Add and subtract fractions with the same denominator (e.g., 3/8 + 2/8 = 5/8).
- Convert improper fractions to mixed numbers (e.g., 7/4 = 1 3/4).
- Simplify fractions to their simplest form (e.g., 4/8 can be simplified to 1/2).
- Solve simple word problems involving fractions (e.g., sharing a pizza into equal parts and figuring out how much each person gets).

From each coloured circle, follow the equivalent fraction and mark the route with arrow. Where do you reach from there:

Red circle? _____

Green circle? _____

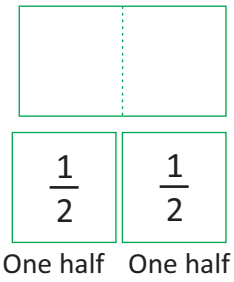
Blue circle? _____



Introduction to Fraction

Take a Task | Watch Remedial

A fraction shows a part of a whole. If an object is divided into equal parts, then each part is called a **fraction**.



One–half

Take a sheet of paper and fold it from the middle to get a crease.

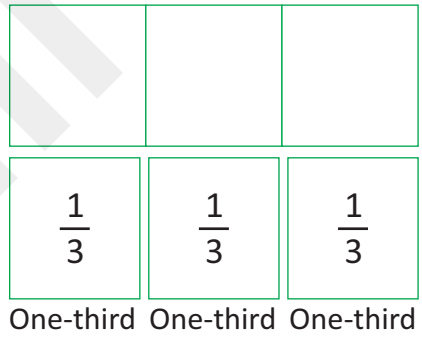
Tear the sheet from the crease to get two equal parts of the sheet.

Each part is one-half of the whole sheet. $\frac{1}{2}$ is read as '**one by two**' or '**one over two**' or '**one half**'.

One–third

If the same sheet of paper is divided into three equal parts, then each part is one-third of the whole sheet.

One-third is also written as $\frac{1}{3}$.



One–fourth

Take a circle and make four pieces of equal size. Each part is one–fourth.

One-fourth is also written as $\frac{1}{4}$.

Naming a Fraction

We need to know the following two facts to write a fraction as a number:

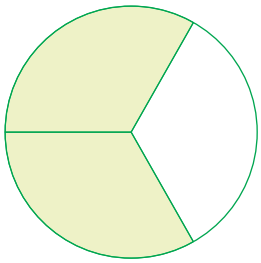
1. How many equal parts is the whole can be divided into. This forms the denominator.
2. How many parts out of the whole are to be considered. This forms the numerator. For example, the chocolate bar is divided into 4 equal parts, if you are given 3 parts, then you have $\frac{3}{4}$ parts of the chocolate.

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

Numerator

Denominator

Fraction as a Part of a whole

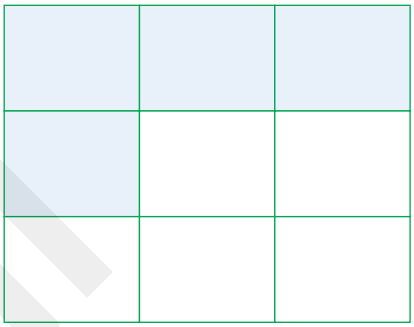


The whole circle is divided into 3 equal parts.

2 parts are shaded and 1 is unshaded.

Fraction of shaded parts = $\frac{2}{3}$

Fraction of unshaded part = $\frac{1}{3}$



The square is divided into 9 equal small squares.

4 of them are shaded and 5 are unshaded.

Fraction of shaded parts = $\frac{4}{9}$

Fraction of unshaded parts = $\frac{5}{9}$

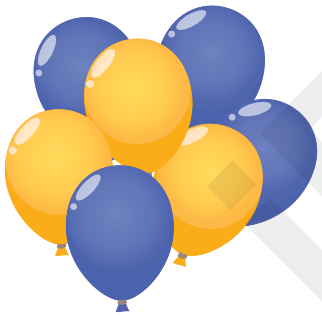
Fractions as a Part of a Group

Look at these groups of objects.

2 dolls are red and 3 dolls are green.

Total number of dolls = 5

Thus, $\frac{2}{5}$ of the dolls are red and $\frac{3}{5}$ of the dolls are green.



4 balloons are blue and 3 balloons are yellow.

Total number of balloons = 7

Thus, $\frac{4}{7}$ of the balloons are blue, and $\frac{3}{7}$ of the balloons are yellow.

Exercise 7.1

Knowledge Application

1. Write the fraction for each part, if the whole is divided into.

(a) Three equal parts

(b) Five equal parts

(c) Six equal parts

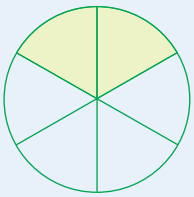
(d) Seven equal parts

2. Write the numerator (N) and denominator (D) for each fraction:

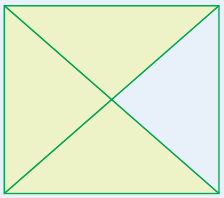
(a) $\frac{5}{17}$ (b) $\frac{7}{8}$ (c) $\frac{9}{11}$ (d) $\frac{11}{14}$ (e) $\frac{6}{23}$

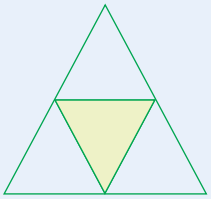
(f) $\frac{11}{12}$ (g) $\frac{6}{19}$ (h) $\frac{4}{17}$ (i) $\frac{3}{19}$ (j) $\frac{1}{28}$

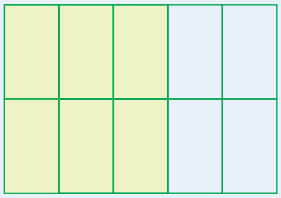
3. Write the fraction for the shaded parts. One has been done for you.

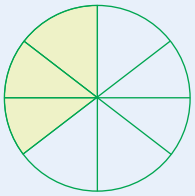
(a) 

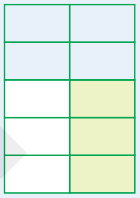
$\frac{2}{6}$

(b) 

(c) 

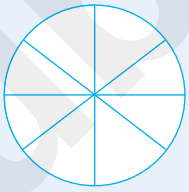
(d) 

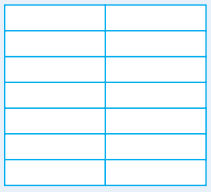
(e) 

(f) 

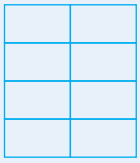
4. Shade to show the following fractions :

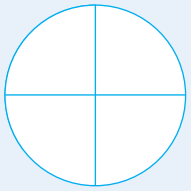
(a) $\frac{2}{5}$ 

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

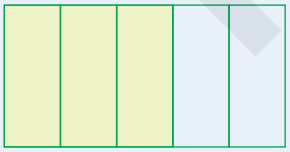
(c) $\frac{4}{7}$ 

(d) $\frac{1}{4}$ 

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

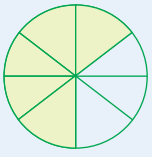
(f) $\frac{2}{4}$ 

5. Write two fractions for each of the following :

(a) 

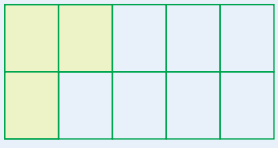
_____ is shaded.

_____ is unshaded.

(b) 

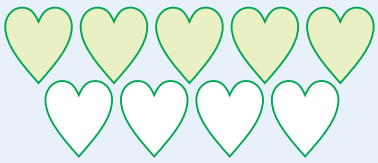
_____ is shaded.

_____ is unshaded.

(c) 

_____ is shaded.

_____ is unshaded.

(d) 

_____ is shaded.

_____ is unshaded.

Types of Fractions

Take a Task

Watch Remedial

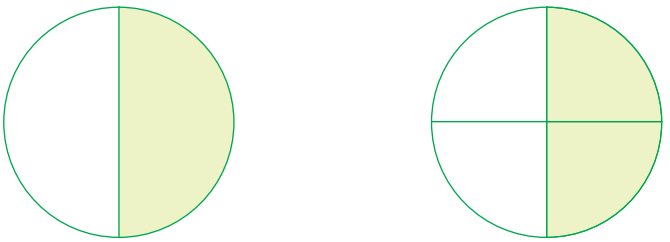
Unit Fractions

In the fractions, $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ etc.

1 is the numerator. So, they are called **unit factions**.

The numerator is 1, it is called unit fraction.

Look at the following circle of same size :

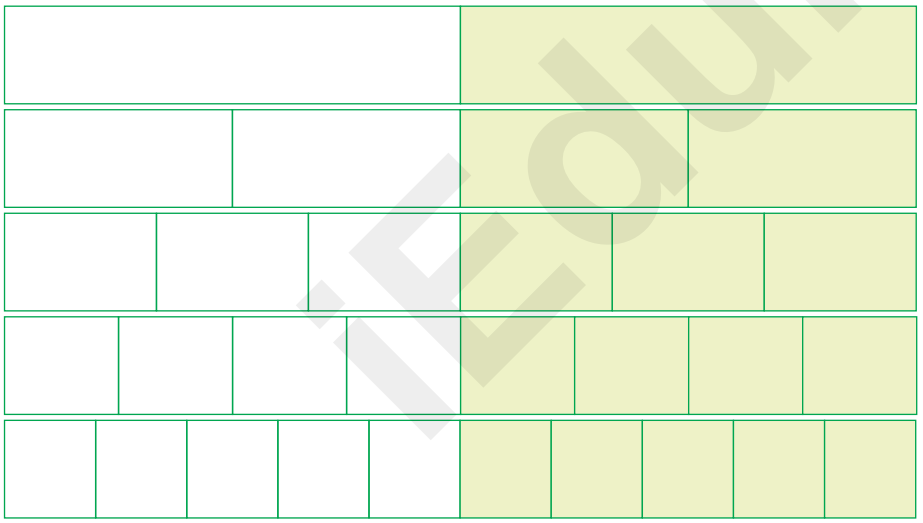


We observe that the shaded parts (i,e. portions) of both the circle are the same-or

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

Hence, $\frac{1}{2}$ and $\frac{2}{4}$ are **equivalent fractions**.

Study the shaded parts of the following five strips carefully :



Shaded part $= \frac{1}{2}$

Shaded part $= \frac{2}{4}$

Shaded part $= \frac{3}{6}$

Shaded part $= \frac{4}{8}$

Shaded part $= \frac{5}{10}$

In all the above strips, the shaded parts are equal.

Forming Equivalent Fractions

To form equivalent fractions, we multiply the numerator and the denominator by the same number.

Example: $\frac{1}{3} = \frac{1\times2}{3\times2} = \frac{2}{6}$ or $\frac{1\times3}{3\times3} = \frac{3}{9}$ or $\frac{1}{3} = \frac{2}{6} = \frac{3}{9}$ $\left[\frac{1}{3}, \frac{2}{6}, \frac{3}{9}\right.$ are equivalent fractions.$\left.\right]$

Example: Are the following fractions equivalent ?

(i) $\frac{5}{7}$ and $\frac{11}{7}$ (ii) $\frac{8}{20}$ and $\frac{10}{25}$

Solution: (i) The given fractions are $\frac{5}{7}$ and $\frac{11}{7}$.

The product of numerator of $\frac{5}{7}$ and denominator of $\frac{11}{7}$ = $5 \times 7 = 35$.

The product of denominator of $\frac{5}{7}$ and numerator of $\frac{11}{7}$ = $7 \times 11 = 77$.

Since 35 is not equal to 77, therefore $\frac{5}{7}$ and $\frac{11}{7}$ are not equivalent fractions.

(ii) The given fractions are $\frac{8}{20}$ and $\frac{10}{25}$.

we have, $\frac{8}{20}$ $\frac{10}{25}$

i.e. $8 \times 25 = 200$ and $20 \times 10 = 200$

Hence, $\frac{8}{20}$ and $\frac{10}{25}$ are equivalent fractions.

Reducing an Equivalent Fraction to its Lowest Term

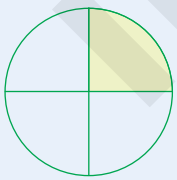
To reduce an equivalent fraction to its lowest term, divide the numerator and denominator by their HCF.

Example : Reduce $\frac{20}{25}$ to its lowest term.

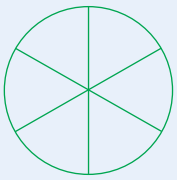
HCF of 20 and 25 = 5. So, $\frac{20}{25} = \frac{20 \div 5}{25 \div 5} = \frac{4}{5}$.

Exercise 7.2

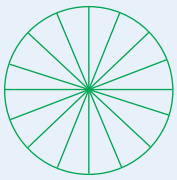
1. Colour the unit fraction. One has been done for you.

(a) 

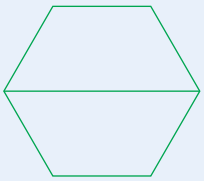
$\frac{1}{4}$

(b) 

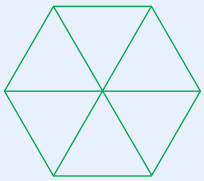
$\frac{1}{6}$

(c) 

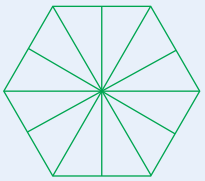
$\frac{1}{16}$

(d) 

$\frac{1}{2}$

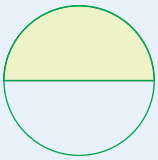
(e) 

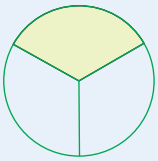
$\frac{1}{6}$

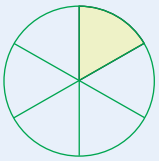
(f) 

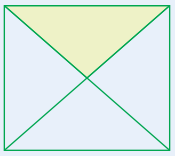
$\frac{1}{12}$

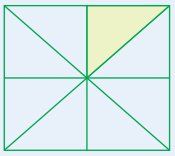
2. Write the unit fraction.

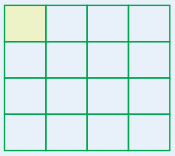
(a)  ____

(b)  ____

(c)  ____

(d)  ____

(e)  ____

(f)  ____

3. Complete the series.

(a) $\frac{1}{5} = \frac{2}{10} = \frac{\square}{15} = \frac{\square}{45}$

(b) $\frac{2}{7} = \frac{\square}{14} = \frac{6}{\square} = \frac{16}{\square}$

(c) $\frac{4}{9} = \frac{16}{\square} = \frac{20}{\square} = \frac{\square}{54}$

(d) $\frac{3}{10} = \frac{\square}{20} = \frac{12}{\square} = \frac{15}{\square}$

4. Reduce these fractions to their lowest terms. One has been done for you.

(a) $\frac{6}{9} = \frac{2}{3}$

(b) $\frac{25}{75} =$ ____

(c) $\frac{7}{14} =$ ____

(d) $\frac{49}{56} =$ ____

(e) $\frac{125}{25} =$ ____

(f) $\frac{12}{36} =$ ____

5. Circle the fractions which are in their lowest terms.

$\frac{7}{11}, \frac{2}{6}, \frac{8}{16}, \frac{9}{21}, \frac{6}{24}, \frac{1}{5}, \frac{3}{15}, \frac{7}{8}, \frac{14}{21}, \frac{9}{13}$

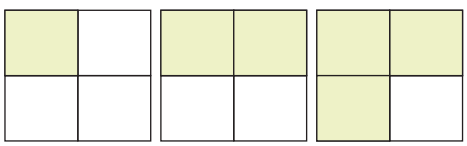
Like Fractions and Unlike Fractions

Fractions are divided into two groups on the basis of the number of parts the whole is divided into: Like and Unlike fractions.

Like Fractions

Fractions such as $\frac{1}{4}, \frac{2}{4}, \frac{3}{4}$, which have the same denominator are called like fractions.

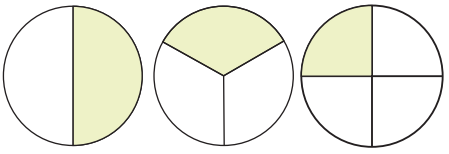
In such cases, a fraction with a greater numerator, is the greater fraction, e.g., $\frac{3}{4} > \frac{2}{4} > \frac{1}{4}$.



$\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$

Unlike Fractions

Fractions such as $\frac{1}{2}, \frac{1}{3}, \frac{1}{4},$ which have different denominators are called unlike fractions. In such cases, the smaller the denominator, the greater is the fraction, e.g., $\frac{1}{2} > \frac{1}{3} > \frac{1}{4}$.



$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$

Proper Fractions and Improper Fractions

Proper Fractions

A fraction in which the numerator is less than the denominator is called a proper fraction. For Example: $\frac{1}{2}, \frac{3}{4}, \frac{5}{7}, \frac{4}{5}$ etc. are proper fractions.

Take a Task

Watch Remedial

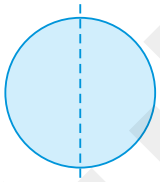
Improper Fractions

A fraction in which the numerator is greater than or equal to the denominator is called an improper fraction.

For example: $\frac{5}{4}, \frac{3}{2}, \frac{4}{2}, \frac{3}{3}, \frac{5}{2}, \frac{13}{8}$ etc. are improper fractions.

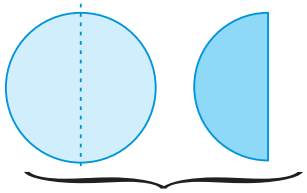
$\frac{1}{2}$

Proper fraction



$\frac{2}{2}$

Fractional form for 1 whole



$\frac{3}{2}$

Improper fraction

Exercise 7.3

1. Arrange in ascending order. One has been done for you.

$\frac{1}{5}, \frac{3}{5}, \frac{2}{5}, \frac{4}{5}, \frac{5}{5} \longrightarrow \frac{1}{5}, \frac{2}{5}, \frac{3}{5}, \frac{4}{5}, \frac{5}{5}$

(a) $\frac{3}{9}, \frac{2}{9}, \frac{4}{9}, \frac{6}{9} \rightarrow$

(b) $\frac{5}{13}, \frac{2}{13}, \frac{7}{13}, \frac{9}{13} \rightarrow$

(c) $\frac{3}{17}, \frac{6}{17}, \frac{7}{17}, \frac{1}{17} \rightarrow$

(d) $\frac{2}{13}, \frac{1}{13}, \frac{8}{13}, \frac{6}{13} \rightarrow$

2. Arrange in descending order. One has been done for you.

$\frac{4}{13}, \frac{6}{13}, \frac{9}{13}, \frac{7}{13} \longrightarrow \frac{9}{13}, \frac{7}{13}, \frac{6}{13}, \frac{4}{13}$

(a) $\frac{2}{19}, \frac{6}{19}, \frac{8}{19}, \frac{4}{19} \rightarrow$

(b) $\frac{5}{14}, \frac{1}{14}, \frac{13}{14}, \frac{11}{14} \rightarrow$

(c) $\frac{5}{11}, \frac{3}{11}, \frac{7}{11}, \frac{4}{11}$ →

(d) $\frac{8}{21}, \frac{14}{21}, \frac{4}{12}, \frac{5}{21}$ →

3. Circle the group of like fractions.

(a) $\frac{1}{14}, \frac{3}{14}, \frac{7}{14}$ (b) $\frac{2}{3}, \frac{3}{6}, \frac{5}{8}$ (c) $\frac{4}{11}, \frac{7}{11}, \frac{9}{11}$

4. Circle the smallest fraction in each option.

(a) $\frac{1}{8}, \frac{3}{8}, \frac{5}{8}$ (b) $\frac{4}{5}, \frac{3}{5}, \frac{1}{5}$ (c) $\frac{2}{7}, \frac{5}{7}, \frac{3}{7}$

5. Circle the proper fractions in each option.

(a) $\frac{3}{8}, \frac{3}{4}, \frac{7}{11}, \frac{8}{25}$ (b) $\frac{8}{3}, \frac{7}{11}, \frac{21}{32}, \frac{25}{31}$ (c) $\frac{45}{40}, \frac{52}{38}, \frac{72}{218}, \frac{129}{88}$

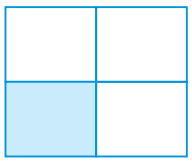
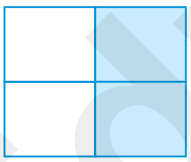
6. Circle the improper fractions in each option.

(a) $\frac{7}{5}, \frac{2}{5}, \frac{1}{3}, \frac{11}{23}$ (b) $\frac{8}{3}, \frac{3}{7}, \frac{6}{8}, \frac{9}{13}$ (c) $\frac{5}{9}, \frac{1}{6}, \frac{10}{7}, \frac{21}{5}$

Addition and Subtraction of Like Fractions

Addition of Like Fractions

Look at the following carefully :

a.  + b.  = c. 

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

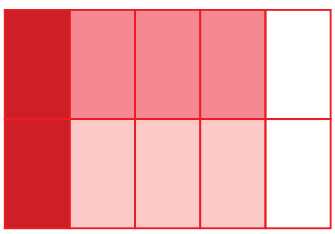
In fig (a) , we observed that the shaded part = $\frac{1}{4}$ of the whole.

In fig (b), the shaded part = $\frac{2}{4}$ of the whole.

In fig (c), the shaded part = $\frac{3}{4}$ of the whole.

Thus $\frac{1}{4} + \frac{2}{4} = \frac{1+2}{4} = \frac{3}{4}$

Mr Ashok painted $\frac{2}{10}$ of his wall on Tuesday, $\frac{3}{10}$ on Wednesday and $\frac{3}{10}$ on Thursday.



How much did he paint altogether?

Step 1: To find the answer, we must add the fractions painted on the each day.

$$\frac{2}{10}+\frac{3}{10}+\frac{3}{10}$$

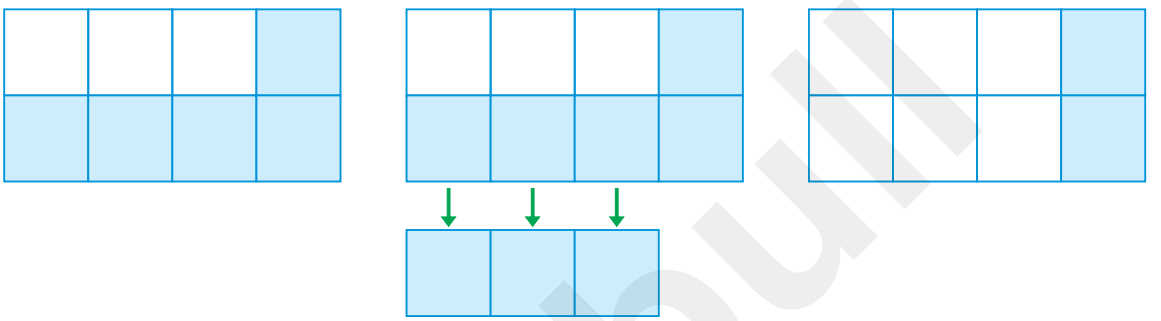
Step 2: Since the given fractions have the same denominator, add the numerators:

$$\frac{2}{10}+\frac{3}{10}+\frac{3}{10}=\frac{2+3+3}{10}=\frac{8}{10}$$

Subtraction of Like Fractions

Subtraction of two fractional numbers of same denominator is similar to their addition as we have learnt earlier.

Look at the following figures:



$$\frac{5}{8} \quad - \quad \frac{3}{8} \quad = \quad \frac{2}{8}$$

i.e. $\frac{5}{8}-\frac{3}{8}=\frac{5-3}{8}=\frac{2}{8}$

Again we have,

$$\frac{4}{5} \quad - \quad \frac{2}{5} \quad = \quad \frac{2}{5}$$

Now, we have the following :

Difference of two fractional numbers having the same

$$\text{denominator} = \frac{\text{difference between the numerators}}{\text{same denominator}}$$

Example : Subtract $\frac{5}{11}$ from $\frac{7}{11}$.

Solution: Both the fraction $\frac{5}{11}$ and $\frac{7}{11}$ have the same denominator, i.e. 11.

So, $\frac{7}{11}-\frac{5}{11}=\frac{7-5}{11}=\frac{2}{11}$

Exercise 7.4

Knowledge Application

1. Add the following fractions :

a. $\frac{7}{13}+\frac{3}{13}$ = ☐

b. $\frac{5}{18}+\frac{6}{18}$ = ☐

c. $\frac{4}{15}+\frac{1}{15}$ = ☐

d. $\frac{6}{19}+\frac{5}{19}$ = ☐

e. $\frac{1}{21}+\frac{2}{21}+\frac{5}{21}$ = ☐

f. $\frac{3}{7}+\frac{1}{7}+\frac{2}{7}$ = ☐

g. $\frac{1}{13}+\frac{3}{13}+\frac{4}{13}$ = ☐

h. $\frac{3}{8}+\frac{1}{8}+\frac{2}{8}$ = ☐

2. Subtract the following fractions :

a. $\frac{7}{15}-\frac{5}{15}$ = _____

b. $\frac{4}{8}-\frac{3}{8}$ = _____

c. $\frac{3}{8}-\frac{1}{8}$ = _____

d. $\frac{8}{19}-\frac{6}{19}$ = _____

e. $\frac{7}{14}-\frac{3}{14}$ = _____

f. $\frac{9}{12}-\frac{1}{12}$ = _____

g. $\frac{5}{17}-\frac{3}{17}$ = _____

h. $\frac{12}{14}-\frac{5}{14}$ = _____

i. $\frac{8}{20}-\frac{4}{20}$ = _____

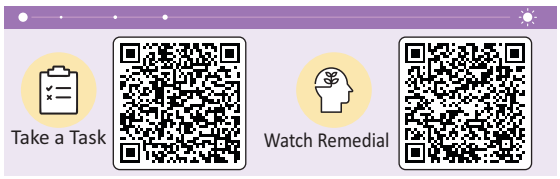
Word Problems on Fractions

Example 1: Supriya required $\frac{11}{4}$ m of cloth for her uniform, whereas her sister Megha required $\frac{14}{4}$ m of cloth. How much material did their mother buy for them ?

Solution : Material required $= \frac{11}{4}+\frac{14}{4}$

$= \frac{11+14}{4} = \frac{25}{4}$ m

Thus, their mother bought $\frac{25}{4}$ metres of cloth.



Example 2: A ribbon was $\frac{7}{8}$ m long. If $\frac{5}{8}$ m was cut off, how much was left?

Solution : The ribbon left $= \frac{7}{8}-\frac{5}{8}$

$= \frac{7}{8}-\frac{5}{8} = \frac{2}{8}$

$= \frac{2\div 2}{8\div 2} = \frac{1}{4}$ m [Reducing $\frac{2}{8}$ to its lowest term]

Thus, $\frac{1}{4}$ m of ribbon was left.

Exercise 7.5

Problem Solving

Answer the following questions:

1. From a rope of length $\frac{13}{19}$ m, $\frac{9}{19}$ m was cut off. How much was left?
2. There are 3 pieces of silk: $\frac{1}{13}$ m, $\frac{3}{13}$ m and $\frac{7}{13}$ m long. How much silk is there altogether?
3. Sushmita used $\frac{3}{5}$ m of a ribbon and Rashmita used $\frac{1}{5}$ m of the same ribbon. How much did they use altogether?
4. From $\frac{5}{7}$ of a cake, Ashok ate $\frac{3}{7}$. How much cake was left ?
5. From $\frac{3}{4}$ of a pizza, Rubi ate $\frac{1}{4}$ and Gungun ate another $\frac{1}{4}$. What fraction of the pizza is left now?

Think Tank

Gap Analyzer™

1. Tick (✓) the correct answer.

(a) $3\frac{1}{4} - 2\frac{1}{6} = ?$

(i) $1\frac{1}{12}$ ☐ (ii) $\frac{1}{12}$ ☐ (iii) $1\frac{1}{11}$ ☐ (iv) $\frac{11}{12}$ ☐

(b) The value of $\frac{7}{4} - \frac{1}{8} + \frac{2}{16}$ is

(i) $1\frac{3}{4}$ ☐ (ii) $\frac{7}{8}$ ☐ (iii) $\frac{2}{8}$ ☐ (iv) $\frac{3}{4}$ ☐

(c) $\frac{10}{7} + \frac{6}{7} = ?$

(i) $1\frac{15}{7}$ ☐ (ii) $\frac{16}{7}$ ☐ (iii) $\frac{30}{7}$ ☐ (iv) $\frac{7}{16}$ ☐

(d) $\frac{5}{4} - \frac{3}{4} = ?$

(i) $\frac{3}{4}$ ☐ (ii) $\frac{2}{4}$ ☐ (iii) $\frac{5}{4}$ ☐ (iv) None ☐

2. Fill in the blanks:

(a) 6, 12, 18, _____, _____, _____, _____, _____.

(b) 9, 18, 27, _____, _____, _____, _____, _____.

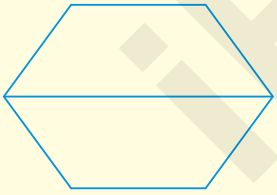
(c) 12, 24, 36, _____, _____, _____, _____, _____.

(d) 16, 32, 48, _____, _____, _____, _____, _____.

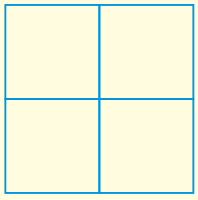
3. Match the following:

(a)	$\frac{250}{400}$	(i)	$\frac{2}{3}$
(b)	$\frac{180}{200}$	(ii)	$\frac{2}{5}$
(c)	$\frac{660}{990}$	(iii)	$\frac{1}{2}$
(d)	$\frac{180}{360}$	(iv)	$\frac{5}{8}$
(e)	$\frac{220}{550}$	(v)	$\frac{9}{10}$

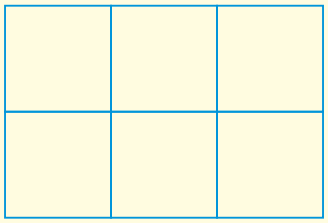
4. Colour the fractions as mentioned below.

(a) 

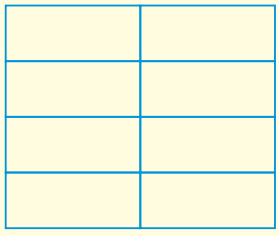
$\frac{1}{2}$

(b) 

$\frac{1}{4}$

(c) 

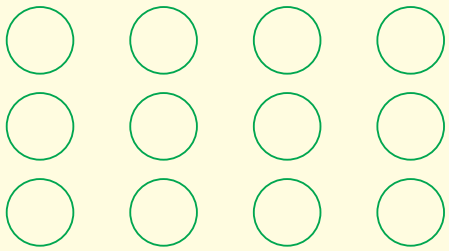
$\frac{5}{6}$

(d) 

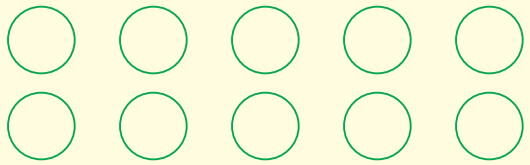
$\frac{3}{8}$

5. Colour the circles to know the fraction in each option.

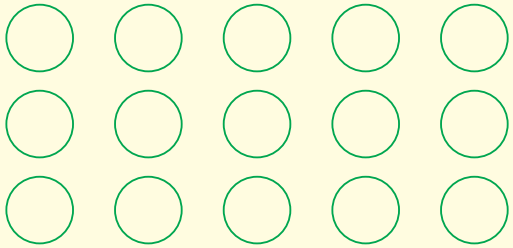
(a) $\frac{7}{12}$



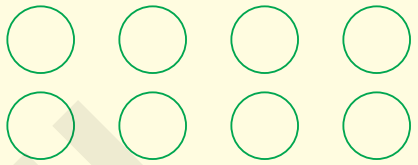
(b) $\frac{6}{10}$



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



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



Custom Learning Path

Scan to Create Your Own Learning Path

Puzzle

Conceptual Learning

Place the fractions in the empty tiles so that every row, column and diagonal give a sum of one whole.

$\frac{2}{12}$	$\frac{1}{2}$	$\frac{4}{12}$

$\frac{1}{6}$		$\frac{1}{3}$
$\frac{3}{6}$	$\frac{2}{6}$	
	$\frac{4}{24}$	$\frac{6}{12}$

Mental Math

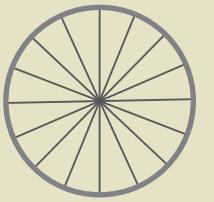
Critical Thinking

1. Who has more legs? 3 spiders, 7 people or 4 dogs.
2. Rajesh is half as old as Varun. Varun is 35 years old. How old is Rajesh?
3. How many types of fractions are there?

Maths Lab Activity

Collaboration

Divide the class into groups of three students.



1. Take a stiff pastel sheet and guide one student from each group to draw a pizza. Now cut it into 8 equal parts.
2. The second student draws a circle of the same size and draws a clock on it. Help him/her to divide it into 12 equal parts.
3. The third student also draws a circle and makes 16 spokes of a wheel. He/she cuts it into 16 equal parts.
4. Let all the groups finish the drawing and cutting.
5. Now all the parts are jumbled and the groups are given a start time so that they may complete their pizzas, clocks and wheels. The group who does it the first gets applauded.