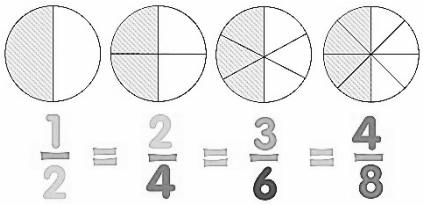
FRACTIONS

Concepts Covered

- Fraction on the Number Line, Types of Fractions.
- Equivalent Fractions.
- Like-Unlike Fractions, Comparing Fractions.
- Addition and Subtraction of Fractions.
- Multiplication ond Division of Fractions.

Introduction

Fraction is a method for representing the parts of a whole number. An orange is divided into two parts then the first part of orange is half of the whole orange and represented by 1/2 of the orange, 1/2 is in fraction and called fractional number.



The upper part of the fraction is called numerator and lower part of the fraction is called denominator. In the fraction, a/b, a is its numerator and b is denominator.

Reciprocal of a fraction is obtained on reversing its order. Therefore, reciprocal of a/b is b/a and product of a fraction with its reciprocal is one; $\frac{a}{b} \times \frac{b}{a} = 1$

For Example: $\frac{24}{16} \times \frac{16}{24} = 1$

Operations on Fractions

In the ratio form of a fractional number, numerator is called dividend and denominator is divisor. Therefore, $6 \div 3$ is expressed in the form of fraction and written as $\frac{6}{3}$.

$\frac{6}{3}$ is not in full simplified or reduced form therefore, by division it can be simplified and the quotient of the division is the simplified form of the fraction. Let us consider an example of fraction $\frac{24}{36}$.

The numerator of the given fraction is not divisible by denominator but 12 is a common divisor between both the numerator and denominator of the fractions. Therefore, its simplified form $\frac{2}{3}$ is the solution of the fraction. The simplified form of the fraction is called reduced form of the fraction.

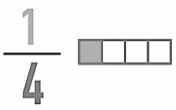
Example:

In the following picture, some parts of picture are shaded but some are not. Find the part of the unshaded portion of the picture.

Solution: Since there are total 5 parts and one of which is not shaded . So 1/5 of the part is unshaded.

Proper Fractions

A fraction which has greater denominator than numerator is called proper fraction. $\frac{3}{5}, \frac{1}{2}, \frac{7}{9}$ are proper fractions.



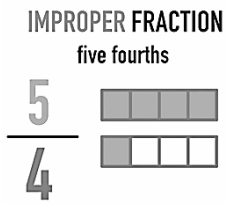
Example:

Choose the proper fraction from the following options:

(A) $\frac{9}{7}$ (B) $\frac{102}{34}$

(C) $\frac{11}{34}$ (D) All of these

Solution: (C), The fraction which has smaller numerator than denominator is called proper fraction.



Improper Fractions

A fraction is called improper fraction if:

- It has smaller denominator than numerator or it has equal numerator and denominator.
- $\frac{6}{5}, \frac{5}{2}, \frac{109}{34}, \frac{6}{6}$ are improper fractions.

Example:

Choose the improper fraction from the following options:

(A) $\frac{56}{3}$ (B) $\frac{2}{3}$

(C) $\frac{25}{43}$ (D) All of these

Solution: (A), The fraction which has greater numerator than denominator is called improper fraction.

Mixed Fractions

The combination of a fraction and a whole number is called mixed fractions. Every mixed fraction can be simplified into an improper fraction, i.e. $5\frac{2}{7}$.

The simplified form of a mixed fraction is always an improper fraction.

Example:

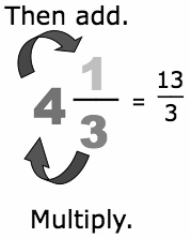
The solution of an expression is $4\frac{1}{2}$. which one of the following is correct about the common name of the solution of the expression?

(A) Mixed Fraction (B) Proper Fraction

(C) Improper Fraction (D) All of these

Solution: (A), $4\frac{1}{2}$ is a mixed fraction.

Conversion of Mixed Fraction



Let us consider a mixed fraction $4\frac{1}{2}$. it is converted into fraction by multiplying denominator to whole and the result of multiplication is added to the numerator of the fraction. The denominator of the resulting fraction is same as the denominator of the mixed fraction. Therefore, the mixed fraction $4\frac{1}{2}$ is written into fraction as $\frac{13}{3}$.

$$\text{Fraction} = \frac{(\text{Denominator of mixed fraction } \times \text{ Whole }) + \text{ Numerator}}{\text{Denominator of the mixed fraction}}$$

Example:

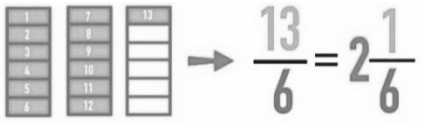
The fraction, $\frac{34}{3}$ is equivalent of which one of the following fractions?

(A) $12\frac{1}{3}$ (B) $13\frac{1}{3}$

(C) $11\frac{1}{3}$ (D) All of these

Solution: (C), $\frac{34}{3} = 11\frac{1}{3}$

Conversion of Improper Fraction into Mixed Fraction



Let us consider an improper fraction $\frac{13}{3}$.

The following steps are used to obtain the mixed fraction of the above given fraction:

Step 1: Divide the numerator by denominator $3 \div 13$ So, Quotient = 4 and Remainder = 1

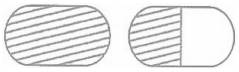
Step 2: Required mixed fraction.

$$\text{Quotient } \frac{\text{Remainder}}{\text{Divisor}} = 4\frac{1}{3}$$

Example:

Add the following shaded parts of the pictures and express the result into its mixed fraction:

(A) $2\frac{1}{2}$ (B) $1\frac{1}{2}$



(C) $1\frac{3}{2}$ (D) All of these

Solution: (B), Here 1 part is shaded full and another part is shaded half. So total is one and half.

Fractions in its Lowest Term

The lowest term of a fraction is obtained when HCF of the numerator and denominator is not other than 1. Let a fraction is $\frac{45}{25}$, the HCF of its numerator and denominator is 5 , therefore, it can be expressed into its lowest term on dividing the fraction by its HCF.

Therefore, $\frac{45\div5}{25\div5} = \frac{9}{5}$, the lowest term of $\frac{45}{25}$ is $\frac{9}{5}$.

$\frac{2}{4} = \frac{1}{2}$	$\frac{3}{9} = \frac{1}{3}$	$\frac{8}{32} = \frac{1}{4}$

Example:

The lowest term of a fraction is obtained when HCF of its numerator and denominator is 2. Find the lowest term of $\frac{102}{46}$

(A) $\frac{2}{3}$ (B) $\frac{52}{21}$

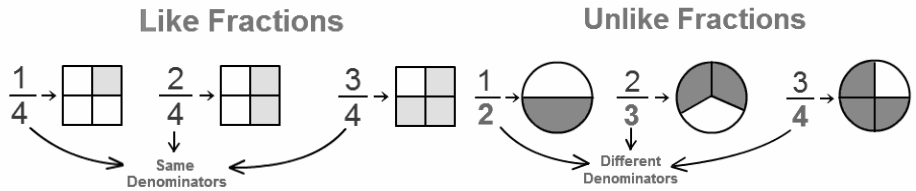
(C) $\frac{51}{23}$ (D) All of these

Solution: (B), HCF of numerator and denominator is 2, dividing by 2, we get $\frac{52}{21}$.

Every whole number has 1 as the denominator.
Zero as the numerator is always zero.
The word fraction comes from Latin word fraction.

Like and Unlike Fractions

When two or more fractions have same denominator then they are called like fractions. While unlike fractions do not have equal denominators.



The fractions, $\frac{1}{4}, \frac{2}{4}, \frac{3}{4}$ are like fractions and $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}$ are unlike fractions.

Example:

Choose the group of unlike fractions from the following groups of fractions:

(A) $\frac{3}{2}, \frac{9}{2}, \frac{5}{2}$ (B) $\frac{5}{2}, \frac{9}{4}, \frac{1}{7}$

(C) $\frac{3}{3}, \frac{9}{3}, \frac{5}{3}$ (D) All of these

Solution: (B), The fractions $\frac{5}{2}, \frac{9}{4}, \frac{1}{7}$ having unequal denominators. Hence, this is the group of unlike fractions.

Comparison of Fractions

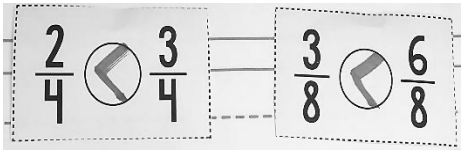
When two or more fractions are given then greater and smaller fractions can be obtained by comparing its numerators and denominators.

Comparison of Like Fractions

Comparison of two fractions which have same denominator or like fractions is obtained on comparing its numerators, in other words, if two or more fractions have equal denominators then the greater fraction has greater numerator and smaller has smaller.

Fractions $\frac{3}{4}$ and $\frac{9}{4}$ have same denominator, therefore, those having greater numerator $\left(\frac{9}{4}\right)$ is greater than other $\left(\frac{3}{4}\right)$.

If two or more fractions have equal numerators but different denominators then those having smaller denominator is greater than other fraction.



Example:

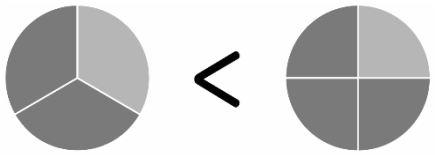
Find the smallest fraction from the following fractions, $\frac{1}{2}, \frac{3}{2}, \frac{4}{2}$.

(A) $\frac{4}{2}$ (B) $\frac{1}{2}$

(C) $\frac{3}{2}$ (D) All of these

Solution: (B), The denominators of the fractions are equal thus the smaller has smaller numerator.

Comparison of Unlike Fractions



Two or more unlike fractions are compared by comparing its equivalent fractions with same denominators. The following steps are used to compare two or more unlike fractions:

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

Step 2: Convert the denominator equal to the LCM by multiplying with same number to those, which do not have denominator equal to the LCM.

Step 3: Now compare the fractions in this way that the greater fraction has greater numerator.

Let two unlike fractions, $\frac{3}{4}, \frac{9}{2}$ are compared as follows, The LCM of both the denominators is 4. Fraction, $\frac{3}{4}$ has denominator as same as the LCM but the fraction $\frac{9}{2}$ has different denominators, so it should be multiplied by 2.

$\frac{9}{2} \times \frac{2}{2} = \frac{18}{4}$, now both the fractions $\frac{3}{4}, \frac{18}{4}$ have equal denominators, therefore, $\frac{18}{4} = \frac{9}{2}$ is greater than because it has greater numerator.

Example:

Find the biggest fraction from the following fractions, $\frac{7}{9}, \frac{3}{7}, \frac{5}{3}$.

(A) $\frac{9}{7}$ (B) $\frac{3}{7}$

(C) $\frac{5}{3}$ (D) All of these

Solution: (C), The LCM of the fractions is 63, therefore, given fractions are converted into its equivalent fractions in such a way that their denominators should be equal. Therefore, $\frac{7}{9}\times\frac{7}{7}=\frac{49}{63}, \frac{3}{7}\times\frac{9}{9}=\frac{27}{63}$ and $\frac{5}{3}\times\frac{21}{21}=\frac{105}{63}$ thus the equivalent fractions of the given fractions are $\frac{49}{63}, \frac{27}{63}, \frac{105}{63}$ respectively. Comparing them, we get $\frac{105}{63}=\frac{5}{3}$ is the greatest fraction because it has greater numerator.

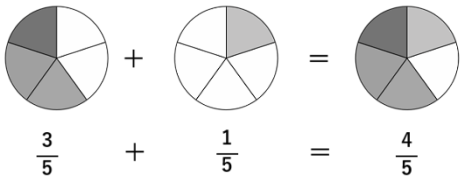
Addition Subtraction, Multiplication and Division of Fractions

Addition of Like Fractions

Addition of like fractions is the addition of its numerator and denominator of the resulting fraction is same as the common denominator.

Like fractions are $\frac{9}{61}, \frac{7}{61}, \frac{5}{61}$, therefore, the addition of the fractions

$$=\frac{\text{Additionofnumerators}}{\text{Common denominators}}=\frac{9+7+5}{61}=\frac{21}{61}$$



Example:

Find the like fractions from the given fractions and add them:

$\frac{5}{2}, \frac{7}{5}, \frac{1}{6}, \frac{121}{2}, \frac{7}{2}$

(A) $\frac{133}{2}$ (B) $\frac{137}{3}$

(C) $\frac{13}{2}$ (D) All of these

Solution: (A), Like fractions from the given fractions $=\frac{5}{2}, \frac{7}{2}, \frac{121}{2}$. Their addition $=\frac{5+7+121}{2}=\frac{133}{2}$

For the better understanding of the fractions the least common multiple should be known. Fractions were written without division line in India.

Addition of Unlike Fractions

The following are the steps to perform the addition of unlike fractions:

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

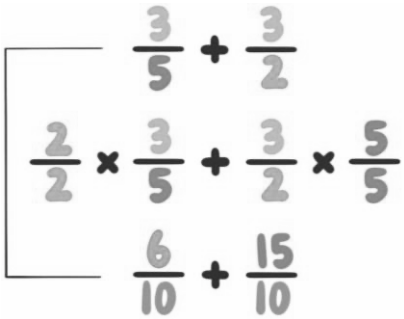
Step 2: Using LCM, multiply the numerators and denominators of all the given fractions such that they have same denominator

Step 3: Add the numerators and write down the addition over common denominator.

Step 4: Reduce the resulting fraction into its lowest term if necessary.

Let two unlike fractions are $\frac{7}{8}$ and $\frac{9}{4}$, therefore, LCM of denominators is 8. Now one fraction has same denominator as the LCM but other has different, so, to make it same as LCM, it should be multiplied by 2, thus the equivalent fraction is $\frac{9}{4}\times\frac{2}{2}=\frac{18}{8}$.

Now the addition $=\frac{7}{8}+\frac{18}{8}=\frac{25}{8}$



Example:

Add the unlike fractions from the given fractions. Choose the correct option for their resulting addition?

$\frac{3}{4}, \frac{7}{2}, \frac{5}{9}, \frac{3}{2}, \frac{1}{8}$

(A) $\frac{72}{103}$ (B) $\frac{103}{72}$

(C) $\frac{7}{103}$ (D) All of these

Solution: (B), $\frac{3}{4}+\frac{5}{9}+\frac{1}{8}=\frac{54+40+9}{72}=\frac{103}{72}$

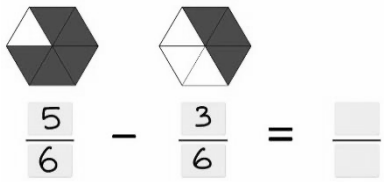
Subtraction of Like Fractions

The subtraction of like fractions is same as its addition except that addition is converted into subtraction.

Let two like fractions are $\frac{567}{456}, \frac{4546}{456}$

Subtraction $=\frac{\text{Subtraction of its numerators}}{\text{Common denominators}}$

$\frac{4546}{456}-\frac{567}{456}=\frac{4546-567}{456}=\frac{3979}{456}$



Example:

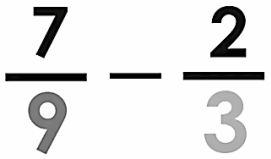
Choose like fractions from the given fractions and find the difference between greatest and smallest fractions: $\frac{5}{3}, \frac{6}{7}, \frac{5}{9}, \frac{7}{3}$

(A) $\frac{7}{9}$ (B) $\frac{2}{3}$

(C) $\frac{5}{7}$ (D) All of these

Solution: (B), Like fractions are $\frac{7}{3}, \frac{5}{3}$ and their difference = $\frac{7}{3}-\frac{5}{3}=\frac{2}{3}$

Subtraction of Unlike Fractions



Steps to perform the subtraction of unlike fractions:
Step 1: Find the LCM of denominators of the fractions.
Step 2: Convert the fractions into its equivalent fractions in such a way that the denominator of every fraction should be equal to their LCM.
Step3: Subtract the numerators and write down the subtraction over common denominator.

Let two unlike fractions are, $\frac{9}{7}$ and $\frac{8}{5}$ therefore, LCM of their denominators is 35. Now multiply the fraction by a number in such a way that denominator should be equal to their LCM. Therefore, the equivalent of $\frac{9}{7}$ is $\frac{45}{35}$ and equivalent of $\frac{8}{5}$ is $\frac{56}{35}$, now their subtraction = $\frac{56-45}{35}=\frac{11}{35}$.

Example:

Find the difference between the fractions $\frac{11}{35}$ and $\frac{7}{5}$

(A) $\frac{37}{35}$ (B) $\frac{45}{175}$

(C) $\frac{38}{35}$ (D) All of these

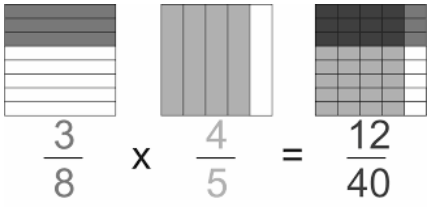
Solution: (C), $\frac{7}{5}-\frac{11}{35}=\frac{49-11}{35}=\frac{38}{35}$

Multiplication of Fractions

The following are the steps to perform the multiplication of unlike and like fractions:
Step 1: Multiply the numerators by numerator denominators by denominator.
Step 2: Write the answer into lowest term of the resulting fraction.

Let us consider the following unlike fractions $\frac{7}{9}, \frac{5}{17}$, therefore, multiplication of the fractions = $\frac{9\times5}{7\times17}=\frac{45}{119}$

Consider the following like fractions $\frac{6}{19}, \frac{4}{19}$,



multiplication of the fractions = $\frac{\text{Product of numerators}}{\text{Product of denominators}} = \frac{6\times4}{19\times19} = \frac{24}{361}$

Example:

Find the product of the given fractions and reduce the resulting products into its lowest term $\frac{4}{13}, \frac{5}{12}$:.

(A) $\frac{5}{41}$ (B) $\frac{4}{41}$

(C) $\frac{5}{39}$ (D) All of these

Solution: (C), Product of the fractions $= \frac{4}{13} \times \frac{5}{12} = \frac{4\times5}{13\times12} = \frac{20}{156}$

The HCF of numerator and denominator = 4, therefore, the lowest or reduced term of the resulting product $= \frac{20\div4}{156\div4} = \frac{5}{39}$

Check Your Concept - 1

(i) Simplify: 8/9 ÷ 4/3 × 6/8 + 2/4 – 1/2.
(A) 1/2 (B) 1
(C) 2 (D) 3

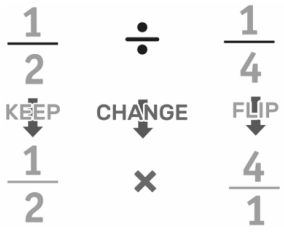
(ii) In an auditorium 8/9 of total seats are occupied by people. If the total number of people in the auditorium is 824 then how many number of sheets are there in the auditorium?
(A) 926 (B) 925
(C) 927 (D) All of these

Division of the Fractions

Division of the fractions is multiplication of dividend by reciprocal of divisor.

Let the fractions are, $\frac{6}{46}, \frac{9}{34}$, division of $\frac{6}{46}$ by $\frac{9}{34}$ is written as, $\frac{6}{46} \div \frac{9}{34}$ and division of the fractions $= \frac{6}{46} \div \frac{9}{34} = \frac{6}{46} \times \frac{34}{9} = \frac{204}{414}$.

The HCF of 204 and 414 is 6 therefore, $\frac{34}{69}$.



Example:

Divide the following fractions, if dividend is $\frac{7}{4}$ and divisor is $\frac{24}{16}$?

(A) $\frac{7}{2}$ (B) $\frac{7}{6}$

(C) $\frac{5}{2}$ (D) All of these

Solution: (B), $\frac{7}{4} \div \frac{24}{16} = \frac{7}{4} \times \frac{16}{24} = \frac{7}{6}$

Check Your Concept - 2

(i) A plastic cane contains 52 litres of vegetable oil. How much oil is left after consuming 3/4 ?
(A) 14 (B) 12
(C) 13 (D) All of these

(ii) A tub contains $\frac{33}{2}$ litres of milk. How many times a glass has to be filled with milk from the tub to empty it, if one glass contains $\frac{3}{2}$ litres of milk?
(A) 12 (B) 10
(C) 11 (D) All of these

(iii) The cost of a wood piece is Rs 100. What would be the cost of each piece of wood on cutting it into 9 equal parts?
(A) 11.22 (B) 11.11
(C) 11.23 (D) All of these

(iv) Denominator of a fraction is 6 greater than its numerator. If the sum of denominator and numerator is 16 then find the fraction?
(A) 5/42 (B) 5/11
(C) 8/105 (D) 6/35

Solved Examples

(1) Reena dyes dresses. She had to dye 30 dresses. She has so far finished 20 dresses. What fraction of dresses has she finished?
Solution: Total number of dresses to be dyed = 30
Number of dresses finished = 20
∴ Required fraction of finished dresses = 20/30 = 2/3

(2) What fraction of these circles have X's in them?
Solution: Total number of circles = 8;
Number of circles having X's = 4
∴ Required fraction = 1/2

(3) Put the appropriate sign in following pairs.
$\frac{3}{7} \square \frac{5}{7}$, $\frac{1}{9} \square \frac{1}{5}$, $\frac{3}{8} \square \frac{0}{8}$, $\frac{5}{18} \square \frac{7}{18}$
Solution: After putting the appropriate signs, we have
$\frac{3}{7} < \frac{5}{7}$, $\frac{1}{9} < \frac{1}{5}$, $\frac{3}{8} > \frac{0}{8}$, $\frac{5}{18} < \frac{7}{18}$

(4) Shankar painted 2/3 of the wall space in his room. His sister Madhu helped and painted 1/3 of the wall space. How much did they paint together?
Solution: Portion of the wall painted by Shankar = 2/3
Portion of the wall painted by Madhu = 1/3
Portion of the wall painted by both = 2/3 + 1/3 = (2+1) / 3 = 3 / 3 = 1
Hence, they painted complete wall together.

(5) Jai was given 5/7 of a basket of oranges. What fraction of oranges was left in the basket?
Solution: Let full basket of oranges = 1 = 7/7
Part of oranges given to Jai = 5/7
∴ Part of oranges left in the basket = 7/7 – 5/7 = (7 – 5) / 7 = 2/7
Hence, 2/7 part of oranges was left in the basket.

(6) Neha's house is 9/10 km from her school. She walked some distance and then took a bus for 1/2 km to reach theschool. How far did she walk?
Solution: Given, distance of school from Neha's house = 9/2 km
Distance covered by Neha by bus = 1/2 km
∴ Distance covered by Neha by walking = 9/10 – 1/2

LCM of 10 and 2 = 10

$$\frac{9}{10}-\frac{1}{2}=\frac{9\times1}{10\times1}-\frac{1\times5}{2\times5}=\frac{9}{10}-\frac{5}{10}=\frac{9-5}{10}=\frac{4}{10}=\frac{2}{5}\ \text{km}$$

(7) The sum of two fractions is always a fraction. (True/ False)
Solution: False, e.g. let two fractions be 3/2 and 5/2.
Now, sum of 3/2 and 5/2 = 3/2 + 5/2 = 8/2 = 4, which is a whole number but not a fraction.

(8) The result obtained by subtracting a fraction from another fraction is necessarily a fraction. (True/ False)
Solution: False, e.g. let two fractions be 5/3 and 11/3.
Now, subtract 5/3 from 11/3 = 11/3 – 5/3 = 6/3 = 2, which is a whole number but not a fraction.

(9) If an object is divided into a number of equal parts, then each part represents a fraction. (True/ False)
Solution: True, Let a whole number be 4 and equal part of 4 = 2, 2
Total number of equal parts = 2
∴ Required fraction = 2/4 = 1/2

(10) Aman divided one fruit cake equally among six persons. What part of the cake he gave to each person?
Solution: Given, total number of fruit cake = 1
Here, Aman divided one fruit cake equally among six persons.
∴ The part of cake given to one person = 1/6.
Hence, the required part is 1/6.

(11) A small tank is 2/5 full of water. The water is then poured into a large empty tank which has a capacity that is twice that of the small tank. What fraction of the large tank is filled with water?
Solution: Let capacity of small tank be x.
∴ Capacity of large tank will be 2x
Water in small tank = 2/5 x
∴ Required fraction = 2x/5 ÷ 2x = 1/5

(12) How many fifths are there in
$3\frac{1}{5}+4\frac{3}{5}$
Solution: We have,

$$3\frac{1}{5}+4\frac{3}{5}=\frac{16}{5}+\frac{23}{5}=\frac{39}{5}$$

So, there are 39 fifths.

(13) Express the following as mixed fractions.
(i) 20/3 (ii) 11/5 (iii) 17/7
Solution: (i) We have, 20/3, On dividing 20 by 3, we get quotient = 6, remainder = 2

$$\therefore\frac{20}{3}=6\frac{2}{3}$$

(ii) We have, 11/5, On dividing 11 by 5, we get quotient = 2, remainder = 1

$$\therefore\frac{11}{5}=2\frac{1}{5}$$

(iii) We have, 11/7, On dividing 17 by 7, we get quotient = 2, remainder = 3

$$\therefore\frac{17}{7}=2\frac{3}{7}$$

(14) Find the equivalent fraction of 36/48 with
(i) numerator 9 (ii) denominator 4'
Solution: Let N stands for the numerator and D stands for the denominator.
Given, numerator of an equivalent fraction = 9

$$\therefore\ \frac{9}{D}=\frac{36}{48}$$

⇒ 9 × 48 = D × 36 [by cross product] ⇒ D = (9 × 48) / 36 = 12 ⇒ D = 12
∴ Required equivalent fraction of 36/48 = N/D = 9/12
(b) Given, denominator of an equivalent fraction = 4

$$\therefore\ \frac{N}{4}=\frac{36}{48}$$

⇒ N × 48 = 4 × 36 [by cross product] ⇒ N = (4 × 36) / 48 = 3 ⇒ N = 3
∴ Required equivalent fraction of 36/48 = N/D = 3/4

(15) Ramesh had 20 pencils, Sheelu had 50 pencils and Jamaal had 80 pencils. After 4 months, Ramesh used up 10 pencils, Sheelu used up 25 pencils and Jamaal used up 40 pencils. What fraction did each use up? Check if each has used up an equal fraction of her/his pencils?

Solution: Here, fraction of pencils used by Ramesh = 10/20

Fraction of pencils used by Sheelu = 25/50 and fraction of pencils used by Jamaal = 40/80

Now, $\frac{10}{20} = \frac{10\div10}{20\div10} = \frac{1}{2}$ [∵ HCF of 10 and 20 is 10]

$\frac{25}{50} = \frac{25\div25}{50\div25} = \frac{1}{2}$ [∵ HCF of 25 and 50 is 25]

And $\frac{40}{80} = \frac{40\div40}{80\div40} = \frac{1}{2}$ [∵ HCF of 40 and 80 is 40]

Thus, $\frac{10}{20} = \frac{25}{50} = \frac{40}{80} = \frac{1}{2}$

(16) Find answers to the following. Write and indicate how you solved them.

(i) Is 5/9 equal to 4/5 (ii) Is 9/16 equal to 5/9

Solution: (i) LCM of 9 and 5 = 45

Now, $\frac{5}{9} = \frac{5\times5}{9\times5} = \frac{25}{45}$ and $\frac{4}{5} = \frac{4\times9}{5\times9} = \frac{36}{45}$

Since, both fractions are like fractions but

$\frac{25}{45} \neq \frac{36}{45} \therefore \frac{5}{9} \neq \frac{4}{5}$

(ii) LCM of 16 and 9 = 144

Now, $\frac{9}{16} = \frac{9\times9}{16\times9} = \frac{81}{144}$ and $\frac{5}{9} = \frac{5\times16}{9\times16} = \frac{80}{144}$

Since, both fractions are like fractions but

$\frac{81}{144} \neq \frac{80}{144} \therefore \frac{9}{16} \neq \frac{5}{9}$

(17) Convert 2009 paise to rupees and express the result as a mixed fraction.

Solution: We know that, 1 paise = 1/100 rupees

∴ 2009 paise =2009/100 rupees = ₹20.09

When, we divide 2009 by 100, we get Quotient =20 and Remainder =9

$\therefore \frac{2009}{100} = 20\frac{9}{100}$

(18) It was estimated that because of people switching to Metro trains, about 33000 tonnes of CNG, 3300 tonnes of diesel and 21000 tonnes of petrol was saved by the end of year 2007. Find the fraction of

(i) the quantity of diesel saved to the quantity of petrol saved.

(ii) the quantity of diesel saved to the quantity of CNG saved.

Solution: Given, quantity of CNG saved = 33000 tonnes

Quantity of diesel saved = 3300 tonnes and quantity of petrol saved = 21000 tonnes

(i)Requried fraction $= \frac{\text{Quantity of diesel saved}}{\text{Quantity of petrol saved}} = \frac{3300}{21000} = \frac{33}{210}$

HCF of 33 and 210 = 3

$\therefore \frac{33}{210} = \frac{33\div3}{210\div3} = \frac{11}{70}$

(ii) Requried fraction $= \frac{\text{Quantity of diesel saved}}{\text{Quantity of CNG saved}} = \frac{3300}{33000} = \frac{33}{330}$

HCF of 33 and 330 = 33

$\therefore \frac{33}{330} = \frac{33\div33}{330\div33} = \frac{1}{10}$

(19) Write the fraction representing the total number of natural numbers in the collecting of numbers -3, -2, -1, 0, 1, 2, 3. What fraction will it be for whole numbers? What fraction will it be for integers?

Solution: Given, the collection of numbers are -3, -2, -1, 0, 1, 2, 3.

Total integer numbers = 7, Total natural numbers = 3

∴ Requried fraction $= \frac{\text{Total natural numbers}}{\text{Total integer numbers}} = \frac{3}{7}$

Now, in the given numbers, total whole numbers = 4

∴ Requried fraction $= \frac{\text{Total natural numbers}}{\text{Total integer numbers}} = \frac{4}{7}$

Again, fraction will be for integers

$\therefore$ Requried fraction $= \dfrac{\text{Total natural numbers}}{\text{Total integer numbers}} = \dfrac{7}{7}$

(20) Naina was given $1\frac{1}{2}$ piece of cake and Najma was given $1\frac{1}{3}$ piece of cake. Find the total amount of cake was given to both of them.

Solution: Cake given to Naina $= 1\frac{1}{2}$ piece;

Cake given to Najma $= 1\frac{1}{3}$ piece

Total cake given to both of them $= 1\frac{1}{2} + 1\frac{1}{3}$

$= \dfrac{1\times 2\times 1}{2} + \dfrac{1\times 3+1}{3} = \dfrac{3}{2} + \dfrac{4}{3}$

LCM of 2 and 3 = 6

$\therefore \dfrac{3}{2} + \dfrac{4}{3} = \dfrac{3\times 3}{2\times 3} + \dfrac{4\times 2}{3\times 2} = \dfrac{9}{3} + \dfrac{8}{6} = \dfrac{9+8}{6} = \dfrac{17}{6}$

Hence, total cake given to both of them = 17/6 piece.

(21) The value of

$3\dfrac{1}{12} - \left[1\dfrac{3}{4} + \left\{2\dfrac{1}{2} - \left(1\dfrac{1}{2} - \dfrac{1}{3}\right)\right\}\right]$

Solution: We have,

$= \dfrac{37}{12} - \left[\dfrac{7}{4} + \left\{\dfrac{5}{2} - \left(\dfrac{3}{2} - \dfrac{1}{3}\right)\right\}\right]$

$= \dfrac{37}{12} - \left[\dfrac{7}{4} + \left\{\dfrac{5}{2} - \left(\dfrac{9-2}{6}\right)\right\}\right]$

$= \dfrac{37}{12} - \left[\dfrac{7}{4} + \left\{\dfrac{15-7}{6}\right\}\right] = \dfrac{37}{12} - \left[\dfrac{7}{4} + \dfrac{8}{6}\right]$

$= \dfrac{37}{12} - \left[\dfrac{21+16}{12}\right] = \dfrac{37}{12} - \dfrac{37}{12} = 0$

(22) Fill in the boxes

(i) $\square - \dfrac{5}{8} = \dfrac{1}{4}$ (ii) $\square - \dfrac{1}{5} = \dfrac{1}{2}$

Solution: (i) Here, 5/8 is subtracted from missing fraction to get 1/4. This means addition of 5/8 and 1/4 gives the missing fraction.

$\therefore$ Missing fraction $= \dfrac{1}{4} + \dfrac{5}{8} = \dfrac{2}{8} + \dfrac{5}{8} = \dfrac{2+5}{8} = \dfrac{7}{8}$

(ii) Here, 1/5 is subtracted from missing fraction to get 1/2. This means addition of 1/2 and 1/5 gives the missing fraction.

$\therefore$ Missing fraction $= \dfrac{1}{2} + \dfrac{1}{5} = \dfrac{5}{10} + \dfrac{2}{10} = \dfrac{5+2}{10} = \dfrac{7}{10}$

(23) Solve:

(i) $\dfrac{1}{18} + \dfrac{1}{18}$ (ii) $\dfrac{8}{15} + \dfrac{3}{15}$, (iii) $\dfrac{7}{7} - \dfrac{5}{7}$

Solution: (i) We have

$\dfrac{1}{18} + \dfrac{1}{18} = \dfrac{1+1}{18} = \dfrac{2}{18} = \dfrac{1}{9}$

(ii) We have

$\dfrac{8}{15} + \dfrac{3}{15} = \dfrac{8+3}{15} = \dfrac{11}{15}$

(iii) We have

$\dfrac{7}{7} + \dfrac{5}{7} = \dfrac{7-5}{7} = \dfrac{2}{7}$

(24) In a class A of 25 students, 20 passed in first class; in another class B of 30 students, 24 passed in first class. In which class, was a greater fraction of students getting first class?

Solution: Fraction of students, who got first class in class A

$= \dfrac{20}{25} = \dfrac{20\div 5}{25\div 5} = \dfrac{4}{5}$

Fraction of students, who got first class in class B

$= \dfrac{24}{30} = \dfrac{24\div 6}{30\div 6} = \dfrac{4}{5}$

$\because \frac{20}{25} = \frac{24}{30} = \frac{4}{5}$

So, it is clear that an equal fractions of students got first class in both the classes

(25) Compare the fractions and put an appropriate sign.

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

Solution: (i) Here, denominators are same of both fractions. So, fractionhaving smaller numerator will be smaller.

$\therefore \frac{3}{6} < \frac{5}{6}$

(ii) Here, numerators are same of both fractions. So, fraction having smaller denominator will be greater.

$\therefore \frac{1}{7} < \frac{1}{4}$

(iii) Here, denominators are same of both fractions. So, fraction having smaller numerator will be smaller.

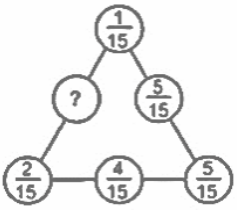
$\therefore \frac{4}{5} < \frac{5}{5}$

(26) What should be placed in the empty space '?' so that the sum of fractions on each side of the triangle is same?

Solution: $\frac{1}{15} + \frac{5}{15} + \frac{5}{15} = \frac{11}{15}$ and $\frac{1}{15} + ? + \frac{2}{15} = \frac{11}{15}$

$\frac{1}{15} + \frac{8}{15} + \frac{2}{15} = \frac{11}{15}$

$\therefore ? = \frac{8}{15}$



(27) Reduce the following fractions to simplest form.

(a) $\frac{48}{60}$, (b) $\frac{150}{60}$

Solution: (a) We have, 48/60

Now, factors of 48 = 2 × 2 × 3 × 2 × 2 and factors of 60 = 2 × 2 × 3 × 5

Common factors = 2, 2 and 3

HCF of 48 and 60 = 2 × 2 × 3 = 12

$\therefore \frac{48}{60} = \frac{48 \div 12}{60 \div 12} = \frac{4}{5}$

Hence, simplest form of the fraction 48/60 is 4/5

(b) We have, 150/60

Now, factors of 150 = 2 × 3 × 5 × 5 and factors of 60 = 2 × 3 × 5 × 2

Common factors = 2, 3 and 5

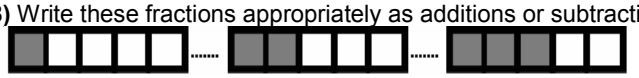
HCF of 150 and 60 = 2 × 3 × 5 = 30

$\therefore \frac{150}{60} = \frac{150 \div 30}{60 \div 30} = \frac{5}{2}$

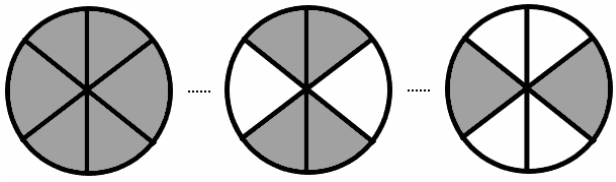
Hence, simplest form of the fraction 150/60 is 5/2

(28) Write these fractions appropriately as additions or subtractions

(a)



(b)



Solution: (a) In first figure, fraction for shaded portion = 1/5

In second figure, fraction for shaded portion = 2/5

and in third figure, fraction for shaded portion = 3/5

Here, third figure represents more shaded portion than first and second figures. So

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

(b) In first figure, fraction for shaded portion = 1 or 5/5

In second figure, fraction for shaded portion = 3/5

and in third figure, fraction for shaded portion = 2/5

Here, third figure represents less shaded portion than first and second figure. So

$1 - \frac{3}{5} = \frac{5-3}{5} = \frac{2}{5}$

(29) Jaidev takes 11/5 minutes to walk across the school ground. Rahul takes 7/4 minutes to do the same. Who takes less time and by what fraction?

Solution: Time taken by Jaidev to walk across the school ground = 11/5 min

and time taken by Rahul to walk across the school ground = 7/4 min

Now, equivalent fractions of 11/5 are

$\frac{11\times 2}{5\times 2}, \frac{11\times 3}{5\times 3}, \frac{11\times 4}{5\times 4}, \frac{11\times 5}{5\times 5}, \ldots \text{i.e.} \frac{22}{10}, \frac{33}{15}, \frac{44}{20}, \frac{55}{25}, \ldots$

and equivalent fractions of 7/4 are

$\frac{7\times 2}{4\times 2}, \frac{7\times 2}{4\times 2}, \frac{7\times 3}{4\times 3}, \frac{7\times 4}{4\times 4}, \frac{7\times 5}{4\times 5}, \ldots i.e. \frac{14}{8}, \frac{21}{12}, \frac{28}{16}, \frac{35}{20}, \ldots$

Here, equivalent fractions 44/20 and 35/20 have same denominators.

∵44>35

$\therefore \frac{44}{20} > \frac{35}{20}\ i.e. \frac{11}{5} > \frac{7}{4}$

$\frac{11}{5} - \frac{7}{4} = \frac{44}{20} - \frac{35}{20} = \frac{44-35}{20} = \frac{9}{20}$

Hence, Rahul takes less time by 9/20 min.

(30) Solve.

(i) Suyash bought 5/2 kg of sugar and Ashish bought 7/2 kg. How much sugar did they buy altogether? If sugar costs 32 rupees per kg, how much did they spend on the sugar they bought?

(ii) Aradhana grows potatoes in 2/5 part of her garden, greens in 1/3 part and brinjals in the remaining part. On how much of her plot did she plant brinjals?

Solutionr: (i) The amount of sugar they bought altogether = 5/2 + 7/2 = 12/2 = 6kg

Now, cost of 1 kg of sugar = Rs 32

Therefore, the cost of 6 kg of sugar is = 6 × 32 = Rs 192

Hence, they spend Rs 192 on the sugar they bought.

(ii) The part of the garden in which Aradhana grew brinjals is given by 1 − 2/5 − 1/3

= 15/15 – 6/15 – 5/15 = 15/15 – 11/15 = 4/15

Hence, Aradhana grew brinjals in 4/15 part of her garden.

Exercise

FILL IN THE BLANKS

(1) $13\frac{5}{18}$ is a _____ fraction.
(2) $\frac{5}{8}$ and $\frac{3}{8}$ are _____ proper fractions.
(3) $\frac{6}{11}$ and $\frac{6}{13}$ are _____ proper fractions.
(4) A number representing a part of a _____ is called a fraction.
(5) A fraction with denominator greater than the numerator is called a _____ fraction.
(6) Fractions with the same denominators are called _____ fractions.
(7) $\frac{17}{101}$ _____ $\frac{12}{101}$
(8) The fraction 17/34 in simplest form is _____.
(9) The fraction 6/15 in simplest form is _____.
(10) When 1/4 is written with denominator as 12, its numerator is _____.
(11) The value of 1 + 2/3 is _____.
(12) 18/5 is an _____ fraction.
(13) 18/135 and 90/675 are proper, unlike and _____ fraction.
(14) 87/7 is equal to the mixed fraction _____.
(15) 23/3 is equal to the mixed fraction _____

TRUE OR FALSE

(1) Fractions with same numerator are called like fraction.
(2) Fraction 18/39 is in its lowest form.
(3) The sum of two fractions is always a proper fraction.
(4) The result obtained by subtracting a fraction from another fraction is necessarily a fraction.
(5) If a whole or an object is divided into a number of equal parts, then each part represents a fraction
(6) In 25/7, 3 is the part of whole.
(7) On a number line, 2/7 is to the right of zero.
(8) 2/5 is smaller than 1/5.
(9) All fractions can be expressed as mixed fraction.
(10) Mean can never be a fraction.
(11) Improper Fraction always has a value of less than one.
(12) Every rational number is a proper fraction.
(13) Every improper fraction can be converted into mixed fraction.

OBJECTIVE TYPE QUESTION

(1) The sum of 4/17 and 15/17 is
(A) 19/17 (B) 11/17
(C) 19/34 (D) 2/17

(2) The sum of 4/7 and 3/7 is
(A) 1/7 (B) 3/4
(C) 4/3 (D) 1

(3) On subtracting 5/9 from 19/9, the result is
(A) 24/9 (B) 14/9
(C) 14/18 (D) 14/0

(4) On Subtracting 1/3 from 1/2, the result is
(A) 1/2 (B) 1/3
(C) 1/12 (D) 1/6

(5) If 5/8 = 20/p, then value of p is
(A) 23 (B) 2
(C) 32 (D) 16

(6) If k/2 = 3/2, then value of k is
(A) 3 (B) 6
(C) 2 (D) 1

(7) If 5/k = 20/p, then value of k/p is
(A) 1/5 (B) 1/4
(C) 20/5 (D) ½

(8) What fraction of an hour is 40 minutes?
(A) 1/2 (B) 1/3
(C) 2/3 (D) 1/4

(9) What fraction of an hour is 30 minutes?
(A) 1/2 (B) 1/3
(C) 2/3 (D) 1/4

(10) What fraction of an hour is 20 minutes?
(A) 1/2 (B) 1/3
(C) 2/3 (D) 1/4

(11) Which of the following is INCORRECT?
(A) 3/4 > 2/3 (B) 4/5 > 1/3
(C) 9/7 > 1 (D) 1/2 < 1/4

(12) Which of the following is CORRECT?
(A) 1/2 > 2/3 (B) 1/5 > 1/3
(C) 1/2 > 1/3 (D) 1/2 < 1/4

(13) On subtracting 5/29 from 9/29, the result is:
(A) 4/9 (B) 14/9
(C) 14/29 (D) 4/29

(14) 11/7 can be expressed in the form
(A) $7\frac{1}{4}$ (B) $4\frac{1}{7}$
(C) $1\frac{4}{7}$ (D) $11\frac{1}{7}$

(15) 10/3 can be expressed in the form
(A) $3\frac{1}{3}$ (B) $3\frac{2}{3}$
(C) $1\frac{1}{3}$ (D) $1\frac{2}{3}$

(16) The mixed fraction $5\frac{4}{7}$ can be expressed as
(A) 33/7 (B) 39/7
(C) 33/4 (D) 39/4

(17) The mixed fraction $4\frac{4}{9}$ can be expressed as
(A) 36/9 (B) 40/9
(C) 36/4 (D) 40/4

(18) Which of the following fractions is the greatest?
(A) 5/7 (B) 5/6
(C) 5/9 (D) 5/8

(19) Which of the following fractions is the greatest?
(A) 11/12 (B) 11/13
(C) 11/14 (D) 11/15

(20) Which of the following fractions is the smallest?
(A) 7/8 (B) 9/8
(C) 3/8 (D) 5/8

(21) Which of the following fractions is the smallest?
(A) 13/18 (B) 13/8
(C) 13/28 (D) 13/38

(22) Sum of 4/17 and 15/17 is
(A) 19/17 (B) 11/17
(C) 19/34 (D) 2/17

(23) The fraction $\frac{1}{2}$ lies between

(A) $\frac{1}{3}$ and $\frac{1}{4}$ (B) $\frac{1}{3}$ and 1

(C) 0 and $\frac{1}{3}$ (D) $\frac{1}{4}$ and 1/5

(24) The fraction $\frac{3}{7}$ lies between

(A) $\frac{2}{7}$ and $\frac{4}{7}$ (B) $\frac{1}{7}$ and $\frac{2}{7}$

(C) $\frac{4}{7}$ and 1 (D)$\frac{4}{7}$ and $\frac{5}{7}$

(25) Which of the fraction lies between 1/3 and 3/5.

(A) $\frac{1}{4}$ (B) $\frac{4}{5}$

(C) $\frac{4}{15}$ (D) $\frac{2}{5}$

(26) Which of the fraction does not lie between 3/10 and 7/10.

(A) $\frac{2}{5}$ (B) $\frac{1}{5}$

(C) $\frac{3}{5}$ (D) $\frac{4}{5}$

Answer Key

CHECK YOUR CONCEPT

(1) **(i)** (A) **(ii)** (C)
(2) **(i)** (C) **(ii)** (C) **(iii)** (B) **(iv)** (B)

FILL IN THE BLANKS

(1) Mixed
(2) Like
(3) Unlike
(4) Whole
(5) Proper
(6) Like
(7) >
(8) ½
(9) 2/5
(10) 3
(11) $\frac{5}{3}$
(12) Improper
(13) Equivalent
(14) $12\frac{3}{7}$
(15) $7\frac{2}{3}$

TRUE OR FALSE

(1) False
(2) False
(3) False
(4) False
(5) True
(6) True
(7) True
(8) False
(9) False
(10) False
(11) False
(12) False
(13) True

OBJECTIVE TYPE QUESTIONS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(A)	(D)	(B)	(D)	(C)	(A)	(B)	(C)	(A)	(B)
(11)	**(12)**	**(13)**	**(14)**	**(15)**	**(16)**	**(17)**	**(18)**	**(19)**	**(20)**
(D)	(C)	(D)	(C)	(A)	(B)	(B)	(B)	(A)	(C)
(21)	**(22)**	**(23)**	**(24)**	**(25)**	**(26)**				
(D)	(A)	(B)	(A)	(D)	(B)				