Chapter 2

Fractions

Introduction

Let us define some terms to understand the concept of fractions

Fraction: A fraction is a number indicating a part of a whole. A fraction is in the form of $\frac{a}{b}$ where 'a' is numerator and 'b' is denominator. For example: $\frac{2}{3}$ is a fraction with numerator '2' and denominator '3'.

Types of fractions

(1) Proper fraction: Those fractions in which numerator is less than the denominator. For example: $\frac{4}{5}, \frac{5}{7}$ etc.

(2) Improper fraction: Those fractions in which numerator is more than or equal to the denominator. For example: $\frac{7}{3}, \frac{19}{7}$ etc.

(3) Mixed fraction: It is a combination of a whole number and a proper fraction. For example: $2\frac{1}{4}, 5\frac{2}{3}$ etc. For conversion of mixed fraction into an improper fraction, we follow one formula:

Improper fraction $= \frac{(whole\ number \times denominator) + numerator}{denominator}$

(4) Equivalent fraction: Those fractions which does not look similar but results in same number after dividing or multiplying by the same non-zero number. For example: $\frac{5}{10}\ and\ \frac{3}{6}$ are the equivalent fractions. After simplification, both results in $\frac{1}{2}$

If $\frac{a}{b}\ and\ \frac{c}{d}$ are two equivalent fractions, then

$\frac{a}{b} = \frac{c}{d} => a \times d = c \times b$

(5) Like fraction: Those fraction which are having same denominators. For example: $\frac{1}{7}, \frac{3}{7}, \frac{5}{7}$ etc.

(6) Unlike fraction: Those fractions which are having different denominators. For example: $\frac{1}{17}, \frac{4}{19}$ etc.

(7) Fraction in lowest terms: Reduce the fraction in its lowest term until numerator and denominator have no common factor other than 1.

(8) Comparing fractions: There are some steps for comparing fractions

Step1: Find LCM of the denominators of the given fractions.

Step2: Convert each fraction to its equivalent fraction with denominator equal to the LCM obtained.

Step3: Arrange the fractions in ascending or descending order by arranging their numerators in ascending order.

Examples

Example 1 - Arrange the following fractions in descending order:

(i) $\frac{2}{9}, \frac{2}{3}, \frac{8}{21}$

Solution: Let us first convert the given fractions into like fractions by taking LCM of the denominators.

LCM of (9, 3, 21) = 3 × 3 × 7 = 63

3	9, 3, 21
3	3, 1, 7
7	1, 1, 7
	1, 1, 1

Now, we convert each of the fractions into equivalent fractions with denominator 63

$$\frac{2}{9} = \frac{2 \times 7}{9 \times 7} = \frac{14}{63}$$

$$\frac{2}{3} = \frac{2 \times 21}{3 \times 21} = \frac{42}{63}$$

$$\frac{8}{21} = \frac{8 \times 3}{21 \times 3} = \frac{24}{63}$$

Now, we arrange the numerators in descending order as follows:

$42 > 24 > 14$

Thus, $\frac{2}{3} > \frac{8}{21} > \frac{2}{9}$

(ii) $\frac{1}{5}, \frac{3}{7}, \frac{7}{10}, \frac{13}{28}$

Solution: Let us first convert the given fractions into like fractions by taking LCM of the denominators.

LCM of $(5, 7, 10, 28) = 2 \times 2 \times 5 \times 7 = 140$

2	5, 7, 10, 28
2	5, 7, 5, 14
5	5, 7, 5, 7
7	1, 7, 1, 7
	1, 1, 1, 1

Now, we convert each of the fractions into equivalent fractions with denominator 140

$$\frac{1}{5} = \frac{1 \times 28}{5 \times 28} = \frac{28}{140}$$

$$\frac{3}{7} = \frac{3 \times 20}{7 \times 20} = \frac{60}{140}$$

$$\frac{7}{10} = \frac{7 \times 14}{10 \times 14} = \frac{98}{140}$$

$$\frac{13}{28} = \frac{13 \times 5}{28 \times 5} = \frac{65}{140}$$

Now, we arrange the numerators in descending order as follows:

$98 > 65 > 60 > 28$

Thus, $\frac{7}{10} > \frac{13}{28} > \frac{3}{7} > \frac{1}{5}$

Example 2 – Ramesh solved $\frac{2}{7}$ part of an exercise while Seema solved $\frac{4}{5}$ of it. Who solved less?

Solution: In this question, we will compare the work done by Ramesh and Seema.

Work done by Ramesh $= \frac{2}{7}$

Work done by Seema $= \frac{4}{5}$

Let us first convert the given fractions into like fractions by taking LCM of the denominators.

LCM of $(5, 7) = 5 \times 7 = 35$

5	5, 7
7	1, 7
	1, 1

Now, we convert each of the fractions into equivalent fractions with denominator 35

$$\frac{2}{7} = \frac{2 \times 5}{7 \times 5} = \frac{10}{35}$$

$$\frac{4}{5} = \frac{4 \times 7}{5 \times 7} = \frac{28}{35}$$

Now, we arrange the numerators in descending order as follows:

$28 > 10$

Thus, $\frac{4}{5} > \frac{2}{7}$

Thus, work done by Ramesh is less than the work done by Seema.

Example 3 – Michael finished coloring a picture in $\frac{7}{12}$ hour. Vaibhav finished coloring the same picture in $\frac{3}{4}$ hour. Who worked longer? By what fraction was it longer?

Solution: In this question, we will compare the time taken by Michael and Vaibhav to color a picture.

Time taken by Michael = $\frac{7}{12}$ hour

Time taken by Vaibhav = $\frac{3}{4}$ hour

Let us first convert the given fractions into like fractions by taking LCM of the denominators.

LCM of (12, 4) = 2 × 2 × 3 = 12

2	12, 4
2	6, 2
3	3, 1
	1, 1

Now, we convert each of the fractions into equivalent fractions with denominator 12

$$\frac{7}{12} = \frac{7 \times 1}{12 \times 1} = \frac{7}{12}$$

$$\frac{3}{4} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$$

Now, we arrange the numerators in descending order as follows:

$9 > 7$

Thus, $\frac{3}{4} > \frac{7}{12}$

Thus, Time taken by Vaibhav is more than Michael. Therefore, Michael worked longer.

Now, $\frac{3}{4} - \frac{7}{12} = \frac{9-7}{12} = \frac{2}{12} = \frac{1}{6}$

Hence, Vaibhav took $\frac{1}{6}$ hour more than Michael to color a picture.

Example 4 – Simplify:

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

Solution: We can write it as $\frac{2}{1} - \frac{3}{5}$

Now, we take LCM of (1, 5) which is 5

Now, we convert each of the fractions into equivalent fractions with denominator 5.

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

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

(ii) $4 + \frac{7}{8}$

Solution: We can write it as $\frac{4}{1} + \frac{7}{8}$

Now, we take LCM of (1, 8) which is 8

Now, we convert each of the fractions into equivalent fractions with denominator 8.

$$\frac{4 \times 8}{1 \times 8} + \frac{7 \times 1}{8 \times 1}$$

$$= \frac{32}{8} + \frac{7}{8} = \frac{32+7}{8} = \frac{39}{8}$$

Now, we will convert $\frac{39}{8}$ into mixed fraction.

$$
\begin{array}{r}
8 \overline{)\ 39\ (}\ 4 \\
\underline{32} \\
7
\end{array}
$$

$$\frac{39}{8} = 4\frac{7}{8}$$

(iii) $\frac{9}{11} - \frac{4}{15}$

Solution: We take LCM of (11, 15) which is 165

Now, we convert each of the fractions into equivalent fractions with denominator 165.

$$\frac{9 \times 15}{11 \times 15} - \frac{4 \times 11}{15 \times 11}$$

$$= \frac{135}{165} - \frac{44}{165} = \frac{135 - 44}{165} = \frac{91}{135}$$

(iv) $8\frac{1}{2} - 3\frac{5}{8}$

Solution: We will convert it into improper fraction as follows:

$$\frac{(8 \times 2) + 1}{2} - \frac{(3 \times 8) + 5}{8} = \frac{16 + 1}{2} - \frac{24 + 5}{8}$$

$$= \frac{17}{2} - \frac{29}{8}$$

Now, we take LCM of (2, 8) which is 8

Now, we convert each of the fractions into equivalent fractions with denominator 8.

$$\frac{17 \times 4}{2 \times 4} - \frac{29 \times 1}{8 \times 1}$$

$$= \frac{68}{8} - \frac{29}{8} = \frac{68 - 29}{8} = \frac{39}{8}$$

Now, we will convert $\frac{39}{8}$ into mixed fraction.

$$8 \overline{)\ 39\ (}\ 4$$
$$\underline{32}$$
$$7$$

$$\frac{39}{8} = 4\frac{7}{8}$$

Example 5 – Simplify: $4\frac{2}{3} - 3\frac{1}{4} + 2\frac{1}{6}$

Solution: We will convert it into improper fraction as follows:

$$\frac{(4 \times 3) + 2}{3} - \frac{(3 \times 4) + 1}{4} + \frac{(2 \times 6) + 1}{6} = \frac{12 + 2}{3} - \frac{12 + 1}{4} + \frac{12 + 1}{6}$$

$$= \frac{14}{3} - \frac{13}{4} + \frac{13}{6}$$

Now, we take LCM of (3, 4, 6) which is 12

Now, we convert each of the fractions into equivalent fractions with denominator 12.

$$\frac{14 \times 4}{3 \times 4} - \frac{13 \times 3}{4 \times 3} + \frac{13 \times 2}{6 \times 2}$$

$$= \frac{56}{12} - \frac{39}{12} + \frac{26}{12} = \frac{56 - 39 + 26}{12} = \frac{43}{12}$$

Now, we will convert $\frac{43}{12}$ into mixed fraction.

$$12 \enclose{longdiv}{43} \quad (\quad 3$$
$$\underline{36}$$
$$7$$

$$\frac{39}{8} = 3\frac{7}{12}$$

Example 6 – Sameera purchased $3\frac{1}{2}$ kg apples and $4\frac{3}{4}$ kg oranges. What is the total weight of fruits purchased by her?

Solution: Weight of apples $= 3\frac{1}{2}$ kg

Weight of oranges $= 4\frac{3}{4}$ kg

Total weight of fruits = $(3\frac{1}{2} + 4\frac{3}{4})$ kg

We will convert it into improper fraction as follows:

$$\frac{(3 \times 2) + 1}{2} + \frac{(4 \times 4) + 3}{4} = \frac{6 + 1}{2} + \frac{16 + 3}{4}$$

$$= \frac{7}{2} + \frac{19}{4}$$

Now, we take LCM of (2, 4) which is 4

Now, we convert each of the fractions into equivalent fractions with denominator 4.

$$\frac{7 \times 2}{2 \times 2} + \frac{19 \times 1}{4 \times 1}$$

$$= \frac{14}{4} + \frac{19}{4} = \frac{14+19}{4} = \frac{33}{4}$$

Now, we will convert $\frac{33}{4}$ into mixed fraction.

$$4 \overline{)33(} \; 8$$
$$\underline{32}$$
$$1$$

$$\frac{33}{4} = 8\frac{1}{4}$$

Therefore, the total weight of fruits = $8\frac{1}{4}$ kg

Example 7 – Ritu ate $\frac{3}{5}$ part of an apple and the remaining apple was eaten by her brother Somu. How much part of the apple did somu eat? Who had the larger share? By how much?

Solution: Total part = 1

Part of apple eaten by Ritu = $\frac{3}{5}$

Part of apple eaten by Somu $= 1 - \frac{3}{5}$

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

We take LCM of (1, 5) which is 5

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

Therefore, Somu ate $\frac{2}{5}$ part of an apple.

Now, we will need to compare the shares of Ritu and somu

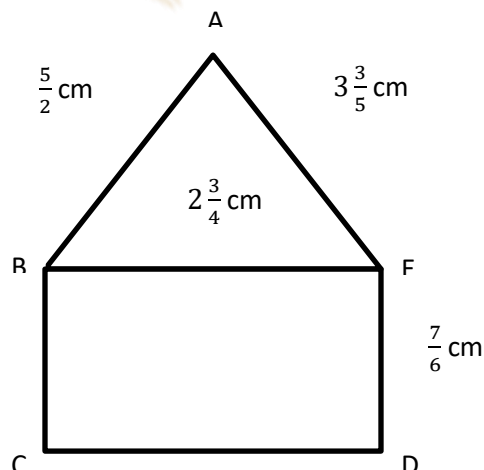We have $\frac{3}{5}$ and $\frac{2}{5}$

Clearly, $\frac{3}{5} > \frac{2}{5}$

Thus, Ritu had larger share.

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

Hence, Ritu ate 1/5 part more than Somu.

Example 8 – In the adjoining Fig. 1, find the perimeters of (i) ∆ABE (ii) the rectangle BCDE. Whose perimeter is greater?

Solution: (i) We know that perimeter = Sum of all sides

Thus, perimeter of $\triangle ABE = AB + AE + BE$

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

We will convert it into improper fraction as follows:

$$\frac{5}{2} + \frac{(3 \times 5) + 3}{5} + \frac{(2 \times 4) + 3}{4} = \frac{5}{2} + \frac{15 + 3}{5} + \frac{8 + 3}{4}$$

$$= \frac{5}{2} + \frac{18}{5} + \frac{11}{4}$$

Now, we take LCM of (2, 5, 4) which is 20

Now, we convert each of the fractions into equivalent fractions with denominator 20.

$$\frac{5 \times 10}{2 \times 10} + \frac{18 \times 4}{5 \times 4} + \frac{11 \times 5}{4 \times 5}$$

$$= \frac{50}{20} + \frac{72}{20} + \frac{55}{20} = \frac{50 + 72 + 55}{20} = \frac{177}{20} \text{ cm}$$

Now, we will convert $\frac{177}{20}$ into mixed fraction.

$$20 \enclose{longdiv}{177} \, (\, 8$$
$$\underline{160}$$
$$17$$

$\frac{177}{20} = 8\frac{17}{20}$ cm

Therefore, the perimeter of $\triangle ABE = 8\frac{17}{20}$ cm

(ii) Since opposite sides of rectangle are equal.

Thus, $BE = CD = 2\frac{3}{4}$ cm

And $BC = ED = \frac{7}{6}$ cm

Perimeter of Rectangle BCDE = BC + CD + DE + BE

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

We will convert it into improper fraction as follows:

$$\frac{7}{6} + \frac{(2 \times 4) + 3}{4} + \frac{7}{6} + \frac{(2 \times 4) + 3}{4} = \frac{7}{6} + \frac{8 + 3}{4} + \frac{7}{6} + \frac{8 + 3}{4}$$

$$= \frac{7}{6} + \frac{11}{4} + \frac{7}{6} + \frac{11}{4}$$

Now, we take LCM of (6, 4) which is 12

Now, we convert each of the fractions into equivalent fractions with denominator 12.

$$\frac{7 \times 2}{6 \times 2} + \frac{11 \times 3}{4 \times 3} + \frac{7 \times 2}{6 \times 2} + \frac{11 \times 3}{4 \times 3}$$

$$= \frac{14}{12} + \frac{33}{12} + \frac{14}{12} + \frac{33}{12} = \frac{14+33+14+33}{12} = \frac{94}{12} \text{ cm} =$$

Now, we will convert $\frac{94}{12}$ into mixed fraction.

$$
\begin{array}{r}
12 \overline{)\,94\,(\,7} \\
84 \\
\hline
10
\end{array}
$$

$$\frac{94}{12} = 7\frac{10}{12} \text{ cm}$$

Therefore, the perimeter of rectangle BCDE = $7\frac{10}{12}$ cm = $7\frac{5}{6}$ cm

Now, we need to compare both perimeters i.e. both fractions $\frac{177}{20}$ and $\frac{94}{12}$

We will take LCM of (20, 12) which is 60

$$\frac{177}{20} = \frac{177 \times 3}{20 \times 3} = \frac{531}{60}$$

$$\frac{94}{12} = \frac{94 \times 5}{12 \times 5} = \frac{470}{60}$$

Clearly, $531 > 470$

Thus, $\frac{177}{20} > \frac{94}{12}$

Hence, ΔABE has greater perimeter.

Example 9 – Salil wants to put a picture in a frame. The picture is $7\frac{3}{5}$ cm wide. To fit in the frame the picture cannot be more than $7\frac{3}{10}$ cm wide. How much the picture should be trimmed?

Solution: Given that, actual width of picture $= 7\frac{3}{5}$ cm

Required width of picture $= 7\frac{3}{10}$ cm

Thus, picture should be trimmed by $(7\frac{3}{5} - 7\frac{3}{10})$ cm

We will convert it into improper fraction as follows:

$$\frac{(7 \times 5) + 3}{5} - \frac{(7 \times 10) + 3}{10} = \frac{35 + 3}{5} - \frac{70 + 3}{10}$$

$$= \frac{38}{5} - \frac{73}{10}$$

Now, we take LCM of (5, 10) which is 10

Now, we convert each of the fractions into equivalent fractions with denominator 10.

$$\frac{38 \times 2}{5 \times 2} - \frac{73 \times 1}{10 \times 1}$$

$$= \frac{76}{10} - \frac{73}{10} = \frac{76-73}{10} = \frac{3}{10} \text{ cm}$$

Therefore, the picture should trimmed by $\frac{3}{10}$ cm

Exercise 2.1

Question 1 – Compare the following fractions by using the symbol > or < or =:

(i) $\frac{7}{9}$ ***and*** $\frac{8}{13}$

Solution: In order to compare the fractions, let us first convert the given fractions into like fractions by taking LCM of the denominators.

LCM of $(9, 13) = 3 \times 3 \times 13 = 117$

3	9, 13
3	3, 13
13	1, 13
	1, 1

Now, we convert each of the fractions into equivalent fractions with denominator 117

$$\frac{7}{9} = \frac{7 \times 13}{9 \times 13} = \frac{91}{117}$$

$$\frac{8}{13} = \frac{8 \times 9}{13 \times 9} = \frac{72}{117}$$

Now, we arrange the numerators in descending order as follows:

$91 > 72$

Thus, $\frac{7}{9} > \frac{8}{13}$

(ii) $\frac{11}{9}$ *and* $\frac{5}{9}$

Solution: Clearly, $11 > 5$

$\Rightarrow \frac{11}{9} > \frac{5}{9}$

(iii) $\frac{37}{41}$ *and* $\frac{19}{30}$

Solution: In order to compare the fractions, let us first convert the given fractions into like fractions by taking LCM of the denominators.

LCM of $(41, 30) = 2 \times 3 \times 5 \times 41 = 1230$

2	41, 30
3	41, 15
5	41, 5
41	41, 1
	1, 1

Now, we convert each of the fractions into equivalent fractions with denominator 1230

$$\frac{37}{41} = \frac{37 \times 30}{41 \times 30} = \frac{1110}{1230}$$

$$\frac{19}{30} = \frac{19 \times 41}{30 \times 41} = \frac{779}{1230}$$

Now, we arrange the numerators in descending order as follows:

$1110 > 779$

Thus, $\frac{37}{41} > \frac{19}{30}$

(iv) $\frac{17}{15}$ *and* $\frac{119}{105}$

Solution: In order to compare the fractions, let us first convert the given fractions into like fractions by taking LCM of the denominators.

LCM of (15, 105) = 5 × 5 × 3 × 7 = 525

5	15, 105
5	3, 35
3	3, 7
7	1, 7
	1, 1

Now, we convert each of the fractions into equivalent fractions with denominator 525

$$\frac{17}{15} = \frac{17 \times 35}{15 \times 35} = \frac{595}{525}$$

$$\frac{119}{105} = \frac{119 \times 5}{105 \times 5} = \frac{595}{525}$$

Now, we arrange the numerators in descending order as follows:

$$595 = 595$$

Thus, $\frac{17}{15} = \frac{119}{105}$

Question 2 – Arrange the following fractions in ascending order:

(i) $\frac{3}{8}, \frac{5}{6}, \frac{6}{8}, \frac{2}{4}, \frac{1}{3}$

Solution: Let us first convert the given fractions into like fractions by taking LCM of the denominators.

LCM of (8, 6, 4, 3) = 2 × 2 × 2 × 3 = 24

2	8, 6, 4, 3
2	4, 3, 2, 3
2	2, 3, 1, 3
3	1, 3, 1, 3
	1, 1, 1, 1

Now, we convert each of the fractions into equivalent fractions with denominator 24

$$\frac{3}{8} = \frac{3 \times 3}{8 \times 3} = \frac{9}{24}$$

$$\frac{5}{6} = \frac{5 \times 4}{6 \times 4} = \frac{20}{24}$$

$$\frac{6}{8} = \frac{6 \times 3}{8 \times 3} = \frac{18}{24}$$

$$\frac{2}{4} = \frac{2 \times 6}{4 \times 6} = \frac{12}{24}$$

$$\frac{1}{3} = \frac{1 \times 8}{3 \times 8} = \frac{8}{24}$$

Now, we arrange the numerators in ascending order as follows:

$8 < 9 < 12 < 18 < 20$

Thus, $\frac{8}{24} < \frac{9}{24} < \frac{12}{24} < \frac{18}{24} < \frac{20}{24}$

Therefore, $\frac{1}{3} < \frac{3}{8} < \frac{2}{4} < \frac{6}{8} < \frac{5}{6}$

(ii) $\frac{4}{6}, \frac{3}{8}, \frac{6}{12}, \frac{5}{16}$

Solution: Let us first convert the given fractions into like fractions by taking LCM of the denominators.

LCM of $(6, 8, 12, 16) = 2 \times 2 \times 2 \times 2 \times 3 = 48$

2	6, 8, 12, 16
2	3, 4, 6, 8
2	3, 2, 3, 4
2	3, 1, 3, 2
3	3, 1, 3, 1
	1, 1, 1, 1

Now, we convert each of the fractions into equivalent fractions with denominator 48

$$\frac{4}{6} = \frac{4 \times 8}{6 \times 8} = \frac{32}{48}$$

$$\frac{3}{8} = \frac{3 \times 6}{8 \times 6} = \frac{18}{48}$$

$$\frac{6}{12} = \frac{6 \times 4}{12 \times 4} = \frac{24}{48}$$

$$\frac{5}{16} = \frac{5 \times 3}{16 \times 3} = \frac{15}{48}$$

Now, we arrange the numerators in ascending order as follows:

$$15 < 18 < 24 < 32$$

Thus, $\frac{15}{48} < \frac{18}{48} < \frac{24}{48} < \frac{32}{48}$

Therefore, $\frac{5}{16} < \frac{3}{8} < \frac{6}{12} < \frac{4}{6}$

Question 3 – Arrange the following in descending order:

(i) $\frac{4}{5}, \frac{7}{10}, \frac{11}{15}, \frac{17}{20}$

Solution: Let us first convert the given fractions into like fractions by taking LCM of the denominators.

LCM of (5, 10, 15, 20) = 2 × 2 × 5 × 3 = 60

5	5, 10, 15, 20
2	1, 2, 3, 4
2	1, 1, 3, 2
3	1, 1, 3, 1
	1, 1, 1, 1

Now, we convert each of the fractions into equivalent fractions with denominator 60

$$\frac{4}{5} = \frac{4 \times 12}{5 \times 12} = \frac{48}{60}$$

$$\frac{7}{10} = \frac{7 \times 6}{10 \times 6} = \frac{42}{60}$$

$$\frac{11}{15} = \frac{11 \times 4}{15 \times 4} = \frac{44}{60}$$

$$\frac{17}{20} = \frac{17 \times 3}{20 \times 3} = \frac{51}{60}$$

Now, we arrange the numerators in descending order as follows:

$51 > 48 > 44 > 42$

Thus, $\frac{51}{60} > \frac{48}{60} > \frac{44}{60} > \frac{42}{60}$

Therefore, $\frac{17}{20} > \frac{4}{5} > \frac{11}{15} > \frac{7}{10}$

(ii) $\frac{2}{7}, \frac{11}{35}, \frac{9}{14}, \frac{13}{28}$

Solution: Let us first convert the given fractions into like fractions by taking LCM of the denominators.

LCM of (7, 35, 14, 28) $= 7 \times 5 \times 2 \times 2 = 140$

7	7, 35, 14, 28
5	1, 5, 2, 4
2	1, 1, 2, 4
2	1, 1, 1, 2
	1, 1, 1, 1

Now, we convert each of the fractions into equivalent fractions with denominator 140

$$\frac{2}{7} = \frac{2 \times 20}{7 \times 20} = \frac{40}{140}$$

$$\frac{11}{35} = \frac{11 \times 4}{35 \times 4} = \frac{44}{140}$$

$$\frac{9}{14} = \frac{9 \times 10}{14 \times 10} = \frac{90}{140}$$

$$\frac{13}{28} = \frac{13 \times 5}{28 \times 5} = \frac{65}{140}$$

Now, we arrange the numerators in descending order as follows:

$90 > 65 > 44 > 40$

Thus, $\frac{90}{140} > \frac{65}{140} > \frac{44}{140} > \frac{40}{140}$

Therefore, $\frac{9}{14} > \frac{13}{28} > \frac{11}{35} > \frac{2}{7}$

Question 4 – Write five equivalent fractions of $\frac{3}{5}$

Solution: Five equivalent fractions of $\frac{3}{5}$ are as follows:

$$\frac{3 \times 2}{5 \times 2} = \frac{6}{10}$$

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

$$\frac{3 \times 4}{5 \times 4} = \frac{12}{20}$$

$$\frac{3 \times 5}{5 \times 5} = \frac{15}{25}$$

$$\frac{3 \times 6}{5 \times 6} = \frac{18}{30}$$

Question 5 – Find the sum:

(i) $\frac{5}{8} + \frac{3}{10}$

Solution: We take LCM of (8, 10) which is 40

Now, we convert each of the fractions into equivalent fractions with denominator 40.

$$\frac{5 \times 5}{8 \times 5} + \frac{3 \times 4}{10 \times 4}$$

$$= \frac{25}{40} + \frac{12}{40} = \frac{25+12}{40} = \frac{37}{40}$$

(ii) $4\frac{3}{4} + 9\frac{2}{5}$

Solution: We will convert it into improper fraction as follows:

$$\frac{(4 \times 4) + 3}{4} + \frac{(9 \times 5) + 2}{5} = \frac{16 + 3}{4} + \frac{45 + 2}{5}$$

$$= \frac{19}{4} + \frac{47}{5}$$

Now, we take LCM of (4, 5) which is 20

Now, we convert each of the fractions into equivalent fractions with denominator 20.

$$\frac{19 \times 5}{4 \times 5} + \frac{47 \times 4}{5 \times 4}$$

$$= \frac{95}{20} + \frac{188}{20} = \frac{118+95}{20} = \frac{283}{20}$$

(iii) $\frac{5}{6} + 3 + \frac{3}{4}$

Solution: We can write it as $\frac{5}{6} + \frac{3}{1} + \frac{3}{4}$

We take LCM of (6, 1, and 4) which is 12

Now, we convert each of the fractions into equivalent fractions with denominator 12.

$$\frac{5 \times 2}{6 \times 2} + \frac{3 \times 12}{1 \times 12} + \frac{3 \times 3}{4 \times 3}$$

$$= \frac{10}{12} + \frac{36}{12} + \frac{9}{12} = \frac{10+36+9}{12} = \frac{55}{12}$$

(iv) $2\frac{3}{5} + 4\frac{7}{10} + 2\frac{4}{15}$

Solution: We will convert it into improper fraction as follows:

$$\frac{(2 \times 5) + 3}{5} + \frac{(4 \times 10) + 7}{10} + \frac{(2 \times 15) + 4}{15} = \frac{10 + 3}{5} + \frac{40 + 7}{10} + \frac{30 + 4}{15}$$

$$= \frac{13}{5} + \frac{47}{10} + \frac{34}{15}$$

Now, we take LCM of (5, 10, and 15) which is 30

Now, we convert each of the fractions into equivalent fractions with denominator 30.

$$\frac{13 \times 6}{5 \times 6} + \frac{47 \times 3}{10 \times 3} + \frac{34 \times 2}{15 \times 2}$$

$$= \frac{78}{30} + \frac{141}{30} + \frac{68}{30} = \frac{78+141+68}{30} = \frac{287}{30}$$

Question 6 – Find the difference of

(i) $\frac{13}{24}$ and $\frac{7}{16}$

Solution: We will find $\frac{13}{24} - \frac{7}{16}$

First, we take LCM of (24, 16) which is 48

Now, we convert each of the fractions into equivalent fractions with denominator 48.

$$\frac{13 \times 2}{24 \times 2} - \frac{7 \times 3}{16 \times 3}$$

$$= \frac{26}{48} - \frac{21}{48} = \frac{26-21}{48} = \frac{5}{48}$$

(ii) 6 and $\frac{23}{3}$

Solution: We will find $\frac{23}{3} - 6 = \frac{23}{3} - \frac{6}{1}$

First, we take LCM of (1, 3) which is 3

Now, we convert each of the fractions into equivalent fractions with denominator 3.

$$\frac{23 \times 1}{3 \times 1} - \frac{6 \times 3}{1 \times 3}$$

$$= \frac{23}{3} - \frac{18}{3} = \frac{23-18}{3} = \frac{5}{3}$$

(iii) $\frac{21}{25}$ **and** $\frac{18}{20}$

Solution: We will find $\frac{18}{20} - \frac{21}{25}$

First, we take LCM of (20, 25) which is 100

Now, we convert each of the fractions into equivalent fractions with denominator 100.

$\frac{18 \times 5}{20 \times 5} - \frac{21 \times 4}{25 \times 4}$

$= \frac{90}{100} - \frac{84}{100} = \frac{90-84}{100} = \frac{6}{100} = \frac{3}{50}$

(iv) $3\frac{3}{10}$ **and** $2\frac{7}{15}$

Solution: We will find $3\frac{3}{10} - 2\frac{7}{15}$

$\frac{(3 \times 10) + 3}{10} - \frac{(2 \times 15) + 7}{15} = \frac{30 + 3}{10} - \frac{30 + 7}{15}$

$\frac{33}{10} - \frac{37}{15}$

First, we take LCM of (10, 15) which is 30

Now, we convert each of the fractions into equivalent fractions with denominator 30.

$\frac{33 \times 3}{10 \times 3} - \frac{37 \times 2}{15 \times 2}$

$= \frac{99}{30} - \frac{74}{30} = \frac{99-74}{30} = \frac{25}{30} = \frac{5}{6}$

Question 7 – Find the difference:

(i) $\frac{6}{7} - \frac{9}{11}$

Solution: First, we take LCM of (7, 11) which is 77

Now, we convert each of the fractions into equivalent fractions with denominator 77.

$$\frac{6 \times 11}{7 \times 11} - \frac{9 \times 7}{11 \times 7}$$

$$= \frac{66}{77} - \frac{63}{77} = \frac{66-63}{77} = \frac{3}{77}$$

(ii) $8 - \frac{5}{9}$

Solution: We will rewrite it as $\frac{8}{1} - \frac{5}{9}$

First, we take LCM of (1, 9) which is 9

Now, we convert each of the fractions into equivalent fractions with denominator 9.

$$\frac{8 \times 9}{1 \times 9} - \frac{5 \times 1}{9 \times 1}$$

$$= \frac{72}{9} - \frac{5}{9} = \frac{72-5}{9} = \frac{67}{9}$$

(iii) $9 - 5\frac{2}{3}$

Solution: We will rewrite it as $\frac{9}{1} - 5\frac{2}{3}$

$$\frac{9}{1} - \frac{(5 \times 3) + 2}{3} = \frac{9}{1} - \frac{17}{3}$$

First, we take LCM of (1, 3) which is 3

Now, we convert each of the fractions into equivalent fractions with denominator 3.

$$\frac{9 \times 3}{1 \times 3} - \frac{17 \times 1}{3 \times 1}$$

$$= \frac{27}{3} - \frac{17}{3} = \frac{27-17}{3} = \frac{10}{3}$$

(iv) $4\frac{3}{10} - 1\frac{2}{15}$

Solution: $\frac{(4\times10)+3}{10} - \frac{(1\times15)+2}{15} = \frac{40+3}{10} - \frac{15+2}{15}$

$\frac{43}{10} - \frac{17}{15}$

First, we take LCM of (10, 15) which is 30

Now, we convert each of the fractions into equivalent fractions with denominator 30.

$\frac{43\times3}{10\times3} - \frac{17\times2}{15\times2}$

$= \frac{129}{30} - \frac{34}{30} = \frac{129-34}{30} = \frac{95}{30} = \frac{19}{6}$

Question 8 – Simplify:

(i) $\frac{2}{3} + \frac{1}{6} - \frac{2}{9}$

Solution: First, we take LCM of (3, 6, and 9) which is 18

Now, we convert each of the fractions into equivalent fractions with denominator 18.

$\frac{2\times6}{3\times6} + \frac{1\times3}{6\times3} - \frac{2\times2}{9\times2}$

$= \frac{12}{18} + \frac{3}{18} - \frac{4}{18} = \frac{12+3-4}{18} = \frac{11}{18}$

(ii) $12 - 3\frac{1}{2}$

Solution: we can write it as: $\frac{12}{1} - \frac{(3\times2)+1}{2}$

$\frac{12}{1} - \frac{7}{2}$

Now, we take LCM of (1 and 2) which is 2

Now, we convert each of the fractions into equivalent fractions with denominator 2.

$$\frac{12 \times 2}{1 \times 2} - \frac{7 \times 1}{2 \times 1}$$

$$= \frac{24}{2} - \frac{7}{2} = \frac{24-7}{2} = \frac{17}{2}$$

(iii) $7\frac{5}{6} - 4\frac{3}{8} + 2\frac{7}{12}$

Solution: We will convert it into improper fraction as follows:

$$\frac{(7 \times 6) + 5}{6} - \frac{(4 \times 8) + 3}{8} + \frac{(2 \times 12) + 7}{12} = \frac{42 + 5}{6} - \frac{32 + 3}{8} + \frac{24 + 7}{12}$$

$$= \frac{47}{6} - \frac{35}{8} + \frac{31}{12}$$

Now, we take LCM of (6, 8, 12) which is 24

Now, we convert each of the fractions into equivalent fractions with denominator 24.

$$\frac{47 \times 4}{6 \times 4} - \frac{35 \times 3}{8 \times 3} + \frac{31 \times 2}{12 \times 2}$$

$$= \frac{188}{24} - \frac{105}{24} + \frac{62}{24} = \frac{188-105+62}{24} = \frac{145}{24}$$

Question 9 – What should be added to $5\frac{3}{7}$ to get 12?

Solution: Let the required number be 'x'

Then, $5\frac{3}{7} + x = 12$

$$\Rightarrow \frac{(5 \times 7) + 3}{7} + x = 12$$

$$\Rightarrow \frac{35 + 3}{7} + x = 12$$

$$\Rightarrow \frac{38}{7} + x = 12$$

$$\Rightarrow x = 12 - \frac{38}{7}$$

$$\Rightarrow x = \frac{12}{1} - \frac{38}{7}$$

Now, we take LCM of (1 and 7) which is 7

Now, we convert each of the fractions into equivalent fractions with denominator 7.

$$\frac{12 \times 7}{1 \times 7} - \frac{38 \times 1}{7 \times 1}$$

$$= \frac{84}{7} - \frac{38}{7} = \frac{84-38}{7} = \frac{46}{7}$$

Question 10 – What should be added to $5\frac{4}{15}$ to get $12\frac{3}{5}$?

Solution: Let the required number be 'x'

Then, $5\frac{4}{15} + x = 12\frac{3}{5}$

$\Rightarrow \frac{(5\times15)+4}{15} + x = \frac{(12\times5)+3}{5}$

$\Rightarrow \frac{75+4}{15} + x = \frac{60+3}{5}$

$\Rightarrow \frac{79}{15} + x = \frac{63}{5}$

$\Rightarrow x = \frac{63}{5} - \frac{79}{15}$

Now, we take LCM of (5 and 15) which is 15

Now, we convert each of the fractions into equivalent fractions with denominator 15.

$$\frac{63 \times 3}{5 \times 3} - \frac{79 \times 1}{15 \times 1}$$

$$= \frac{189}{15} - \frac{79}{15} = \frac{189-79}{15} = \frac{110}{15} = \frac{22}{3}$$

Question 11 – Suman studies for $5\frac{2}{3}$ hours daily. She devotes $2\frac{4}{5}$ hours of her time for science and mathematics. How much time does she devote for other subjects?

Solution: Total time spent by Suman for her studies = $5\frac{2}{3}$ hours

Time spent for mathematics and Science = $2\frac{4}{5}$ hours

Thus, time spent by her for other subjects = $(5\frac{2}{3} - 2\frac{4}{5})$ hours

First, we will convert this into improper fraction as follows:

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

$$\frac{15 + 2}{3} - \frac{10 + 4}{5}$$

$$\frac{17}{3} - \frac{14}{5}$$

Now, we take LCM of (3 and 5) which is 15

$$\frac{17 \times 5}{3 \times 5} - \frac{14 \times 3}{5 \times 3}$$

$$\frac{85}{15} - \frac{42}{15} = \frac{85 - 42}{15} = \frac{43}{15}$$

Now, we will convert it in mixed fraction as follows:

$$15 \overline{\smash{\big)}\, 43 \,} \big(\, 2$$
$$\underline{30}$$
$$13$$

$$\frac{43}{15} = 2\frac{13}{15}$$

Thus, time spent by her for other subjects $= 2\frac{13}{15}$ hours.

Question 12 – A piece of wire is of length $12\frac{3}{4}$ m. If it is cut into two pieces in such a way that the length of one piece is $5\frac{1}{4}$ m, what is the length of the other piece?

Solution: Total length of wire $= 12\frac{3}{4}$ m

Length of one piece $= 5\frac{1}{4}$ m

Thus, length of other piece $= 12\frac{3}{4} - 5\frac{1}{4}$

First, we will convert this into improper fraction as follows:

$$\frac{(12 \times 4) + 3}{4} - \frac{(5 \times 4) + 1}{4}$$

$$\frac{48+3}{4} - \frac{20+1}{4}$$

$$\frac{51}{4} - \frac{21}{4}$$

$$= \frac{51-21}{4} = \frac{30}{4} = \frac{15}{2}$$

Now, we will convert it in mixed fraction as follows:

```
            )  15  (  7
2
              14
             ___
              1
```

$$\frac{15}{2} = 7\frac{1}{2}$$

Thus, length of other piece = $7\frac{1}{2}$ m

Question 13 – A rectangular sheet of paper is $12\frac{1}{2}$ cm long and $10\frac{2}{3}$ cm wide. Find its perimeter.

Solution: Given that, length of rectangular sheet of paper = $12\frac{1}{2}$ cm

Width of sheet = $10\frac{2}{3}$ cm

Since, perimeter of rectangle = $2 \times (length + width)$

$$= 2 \times \left(12\frac{1}{2} + 10\frac{2}{3}\right)$$

First, we will convert this into improper fraction as follows:

$$2 \times \left(\frac{(12 \times 2) + 1}{2} + \frac{(10 \times 3) + 2}{3}\right)$$

$$2 \times \left(\frac{24+1}{2} + \frac{30+2}{3}\right)$$

$$2 \times \left(\frac{25}{2} + \frac{32}{3}\right)$$

Now, we take LCM of (2 and 3) which is 6

$$2 \times (\frac{25 \times 3}{2 \times 3} + \frac{32 \times 2}{3 \times 2})$$

$$2 \times (\frac{75}{6} + \frac{64}{6})$$

$$2 \times (\frac{75 + 64}{6})$$

$$2 \times (\frac{139}{6})$$

$$\frac{139}{3}$$

Now, we will convert it in mixed fraction as follows:

```
        )‾‾139‾‾(   46
3
          12
          ‾‾‾
          19
          18
          ‾‾‾
           1
```

$\frac{139}{3} = 46\frac{1}{3}$

Thus, Perimeter of rectangular sheet = $46\frac{1}{3}$ cm

Question 14 – In a "magic square", the sum of the numbers in each row, in each column and along the diagonal is the same. Is this a magic square?

$\frac{4}{11}$	$\frac{9}{11}$	$\frac{2}{11}$
$\frac{3}{11}$	$\frac{5}{11}$	$\frac{7}{11}$
$\frac{8}{11}$	$\frac{1}{11}$	$\frac{6}{11}$

Solution: We will show that sum along all the directions remains same

First row: $\frac{4}{11} + \frac{9}{11} + \frac{2}{11} = \frac{4+9+2}{11} = \frac{15}{11}$

Second row: $\frac{3}{11} + \frac{5}{11} + \frac{7}{11} = \frac{3+5+7}{11} = \frac{15}{11}$

Third row: $\frac{8}{11} + \frac{1}{11} + \frac{6}{11} = \frac{8+1+6}{11} = \frac{15}{11}$

First column: $\frac{4}{11} + \frac{3}{11} + \frac{8}{11} = \frac{4+3+8}{11} = \frac{15}{11}$

Second column: $\frac{9}{11} + \frac{5}{11} + \frac{1}{11} = \frac{9+5+1}{11} = \frac{15}{11}$

Third column: $\frac{2}{11} + \frac{7}{11} + \frac{6}{11} = \frac{2+7+6}{11} = \frac{15}{11}$

One diagonal: $\frac{4}{11} + \frac{5}{11} + \frac{6}{11} = \frac{4+5+6}{11} = \frac{15}{11}$

Other diagonal: $\frac{2}{11} + \frac{5}{11} + \frac{8}{11} = \frac{2+5+8}{11} = \frac{15}{11}$

Since, the sum along all the directions is equal. Thus, it is a "magic square".

Question 15 – The cost of mathematics book is Rs $25\frac{3}{4}$ and that of science book is Rs $20\frac{1}{2}$. Which costs more and by how much?

Solution: Given that, cost of mathematics book = Rs $25\frac{3}{4}$

Cost of science book = Rs $20\frac{1}{2}$

First, we will convert both the mixed fractions into improper fractions as follows:

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

$20\frac{1}{2} = \frac{(20 \times 2) + 1}{2} = \frac{40+1}{2} = \frac{41}{2}$

Now, we convert them into equivalent fractions by taking LCM of the denominators

LCM of (4 and 2) is 4

$\frac{103}{4} = \frac{103 \times 1}{4 \times 1} = \frac{103}{4}$

$\frac{41}{2} = \frac{41 \times 2}{2 \times 2} = \frac{82}{4}$

Clearly, $103 > 82$

Thus, $25\frac{3}{4} > 20\frac{1}{2}$

Therefore, Mathematics book costs more than science book.

Now, $25\frac{3}{4} - 20\frac{1}{2}$

$= \frac{103}{4} - \frac{41}{2}$

$= \frac{103 \times 1}{4 \times 1} - \frac{41 \times 2}{2 \times 2}$

$= \frac{103}{4} - \frac{82}{4} = \frac{103 - 82}{4} = \frac{21}{4}$

Now, we will convert it in mixed fraction as follows:

$$4 \overline{)21}(\ 5$$
$$\underline{20}$$
$$1$$

$\frac{19}{4} = 5\frac{1}{4}$

Thus, cost of math book is Rs $5\frac{1}{4}$ more than science book.

Question 16 – (i) Provide the number in box ☐ and also give its simplest form in each of the following:

(i) $\frac{2}{3} \times$ ☐ $= \frac{10}{30}$

Solution: In order to make numerator as 10, 2 must be multiplied by 5 and in order to make denominator as 30, 3 must be multiplied by 10

Thus, $\frac{2}{3}$ must be multiplied by $\frac{5}{10}$ to get the result as $\frac{10}{30}$

Its simplest form is $\frac{5}{10} = \frac{1}{2}$

(ii) $\frac{3}{5} \times$ ☐ $= \frac{24}{75}$

Solution: In order to make numerator as 24, 3 must be multiplied by 8 and in order to make denominator as 75, 5 must be multiplied by 15

Thus, $\frac{3}{5}$ must be multiplied by $\frac{8}{15}$ to get the result as $\frac{24}{75}$

Its simplest form is $\frac{8}{15}$

Multiplication of fractions:

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

Let us understand this by examples:

Example 1 – Multiply:

(i) $\frac{2}{9}$ by $\frac{4}{5}$

Solution: $\frac{2}{9} \times \frac{4}{5} = \frac{2 \times 4}{9 \times 5} = \frac{8}{45}$

(ii) $\frac{3}{5}$ by 12

Solution: $\frac{3}{5} \times 12 = \frac{3}{5} \times \frac{12}{1} = \frac{36}{5}$

Now, we will convert it in mixed fraction as follows:

$$5 \overline{)\, 36 \,(}\ 7$$
$$\underline{35}$$
$$1$$

$\frac{36}{5} = 7\frac{1}{5}$

(iii) $2\frac{1}{3}$ by $\frac{2}{5}$

Solution: We can write it as:

$$\frac{(2 \times 3) + 1}{3} \; by \; \frac{2}{5}$$

$$\frac{7}{3} \times \frac{2}{5} = \frac{7 \times 2}{3 \times 5} = \frac{14}{15}$$

(iv) $5\frac{3}{4}$ **by** $2\frac{3}{7}$

Solution: We can write it as:

$$\frac{(5 \times 4) + 3}{4} \; by \; \frac{(2 \times 7) + 3}{7}$$

$$\frac{23}{4} \times \frac{17}{7} = \frac{23 \times 17}{4 \times 7} = \frac{391}{28}$$

Now, we will convert it in mixed fraction as follows:

$$28 \overline{) \; 391 \;} (\; 13$$
$$\underline{28}$$
$$111$$
$$\underline{84}$$
$$27$$

$$\frac{391}{28} = 13\frac{27}{28}$$

Example 2 – Multiply and reduce to lowest form (if possible):

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

Solution: $\frac{2 \times 5}{3 \times 4} = \frac{10}{12}$

Now, 2 is common factor between 10 and 12. So, we divide each term by 2

Thus, $\frac{10}{12} = \frac{5}{6}$

(ii) $\frac{1}{3} \times \frac{15}{8}$

Solution: $\frac{1 \times 15}{3 \times 8} = \frac{15}{24}$

Now, 3 is common factor between 15 and 24. So, we divide each term by 3

Thus, $\frac{15}{24} = \frac{5}{8}$

(iii) $\frac{4}{5} \times \frac{12}{7}$

Solution: $\frac{4 \times 12}{5 \times 7} = \frac{48}{35}$

Now, we will convert it in mixed fraction as follows:

$$35 \overline{)\ 48\ } (\ 1$$
$$\underline{35}$$
$$13$$

$\frac{48}{35} = 1\frac{13}{35}$

Example 3 – Simplify:

(i) $5 \times \frac{3}{20} \times \frac{2}{15}$

Solution: $\frac{5}{1} \times \frac{3}{20} \times \frac{2}{15} = \frac{5 \times 3 \times 2}{1 \times 20 \times 15} = \frac{30}{300}$

Now, 30 is common factor of 30 and 300. So, we divide each term by 30

Thus, $\frac{30}{300} = \frac{1}{10}$

(ii) $\frac{14}{25} \times \frac{35}{51} \times \frac{34}{49}$

Solution: $\frac{14}{25} \times \frac{35}{51} \times \frac{34}{49} = \frac{14 \times 35 \times 34}{25 \times 51 \times 49}$

In case of difficult multiplication, we cancel out the terms in numerator and denominator

$$\frac{\overset{2}{\cancel{14}} \times \overset{\cancel{7}}{\cancel{35}} \times \overset{2}{\cancel{34}}}{\underset{5}{\cancel{25}} \times \underset{3}{\cancel{51}} \times \underset{\cancel{7}}{\cancel{49}}}$$

$= \frac{4}{15}$

Example 4 – Which is greater? $\frac{2}{7}$ of $\frac{3}{4}$ or, $\frac{3}{5}$ of $\frac{5}{8}$

Solution: (1) $\frac{2}{7}$ of $\frac{3}{4}$ $= \frac{2}{7} \times \frac{3}{4} = \frac{2 \times 3}{7 \times 4} = \frac{6}{28}$

Now, 2 is common factor of 6 and 28. So, we divide each term by 2=

$=> \frac{6}{28} = \frac{3}{14}$

(2) $\frac{3}{5}$ of $\frac{5}{8}$ $= \frac{3}{5} \times \frac{5}{8} = \frac{3 \times \cancel{5}}{\cancel{5} \times 8} = \frac{3}{8}$

Now, for comapring $\frac{3}{14}$ and $\frac{3}{8}$, we need to convert them in equivalent fractions.

We take LCM of (14 and 8) which is 56

$$\frac{3}{14} = \frac{3 \times 4}{14 \times 4} = \frac{12}{56}$$

$$\frac{3}{8} = \frac{3 \times 7}{8 \times 7} = \frac{21}{56}$$

Clearly, $21 > 12$

Thus, $\frac{21}{56} > \frac{12}{56}$

Therefore, $\frac{3}{5}$ of $\frac{5}{8}$ is greater than $\frac{2}{7}$ of $\frac{3}{4}$

Example 5 – Find:

(i) $\frac{3}{5}$ of a rupee

Solution: Since 1 rupee = 100 paise

Thus, $\frac{3}{5} \times 100 = \frac{3}{5} \times \frac{100}{1} = \frac{3 \times 100}{5 \times 1} = \frac{\cancel{300}^{60}}{\cancel{5}}$

= 60 paise

(ii) $\frac{3}{4}$ **of a year**

Solution: Since 1 year = 12 months

Thus, $\frac{3}{4} \times 12 = \frac{3}{4} \times \frac{12}{1} = \frac{3 \times 12}{4 \times 1} = \frac{\overset{9}{\cancel{36}}}{\cancel{4}}$

= 9 months

(iii) $\frac{2}{3}$ **of a day**

Solution: Since 1 day = 24 hours

Thus, $\frac{2}{3} \times 24 = \frac{2}{3} \times \frac{24}{1} = \frac{2 \times 24}{3 \times 1} = \frac{\overset{16}{\cancel{48}}}{\cancel{3}}$

= 16 hours

(iv) $\frac{5}{8}$ **of a kilogram**

Solution: Since 1 kilogram = 1000 grams

Thus, $\frac{5}{8} \times 1000 = \frac{5}{8} \times \frac{1000}{1} = \frac{5 \times 1000}{8 \times 1} = \frac{\overset{625}{\cancel{5000}}}{\cancel{8}}$

= 625 grams

(v) $\frac{2}{3}$ **of an hour**

Solution: Since 1 hour = 60 minutes

Thus, $\frac{2}{3} \times 60 = \frac{2}{3} \times \frac{60}{1} = \frac{2 \times 60}{3 \times 1} = \frac{\overset{40}{\cancel{120}}}{\cancel{3}}$

= 40 minutes

(vi) $\frac{7}{25}$ **of a litre**

Solution: Since 1 litre = 1000 mL

Thus, $\frac{7}{25} \times 1000 = \frac{7}{25} \times \frac{1000}{1} = \frac{7 \times 1000}{25 \times 1} = \frac{\overset{280}{\cancel{7000}}}{\cancel{25}}$

= 280 mL

Example 6 – Sugar is sold at Rs$17\frac{3}{4}$ per kg. Find the cost of $8\frac{1}{2}$ kg of a sugar.

Solution: Given that, Cost of 1 kg sugar = Rs$17\frac{3}{4}$

Thus, cost of $8\frac{1}{2}$ kg of sugar = Rs$\left(17\frac{3}{4} \times 8\frac{1}{2}\right)$

We will convert it into improper fraction.

$= \frac{(17 \times 4) + 3}{4} \times \frac{(8 \times 2) + 1}{2}$

$= \frac{68 + 3}{4} \times \frac{16 + 1}{2}$

$= \frac{71}{4} \times \frac{17}{2}$

$= \frac{1207}{8}$

Now, we will convert it in mixed fraction as follows:

$$
\begin{array}{r}
8\overline{)1207}(150 \\
\underline{8} \\
407 \\
\underline{40} \\
07
\end{array}
$$

$\frac{1207}{8} = 150\frac{7}{8}$

Thus, cost of $8\frac{1}{2}$ kg of sugar = Rs$150\frac{7}{8}$

Example 7 – A car runs 16 km using 1 litre of petrol. How much distance will it cover using $2\frac{3}{4}$ litres of petrol?

Solution: Given that, distance covered by a car using 1 litre of petrol = 16 km

Distance covered by car using $2\frac{3}{4}$ litres of petrol = $(16 \times 2\frac{3}{4})$ km

$= 16 \times \frac{(2\times 4)+3}{4}$

$= 16 \times \frac{8+3}{4}$

$= \overset{4}{\cancel{16}} \times \frac{11}{\cancel{4}}$

$= 44$ km

Thus, distance covered using $2\frac{3}{4}$ litres of petrol = 44 km

Example 8 – Shikha has read $\frac{3}{4}$ of a book consisting of 288 pages. How many pages are still left?

Solution: Given that, total number of pages in the book = 288

Number of pages read by shikha = $\frac{3}{\cancel{4}} \times \overset{72}{\cancel{288}} = 72 \times 3 = 216$

Therefore, number of pages left = $288 - 216 = 72$

Example 9 – A rectangular park is $20\frac{3}{4}$ m long and $15\frac{1}{2}$ m wide. What is the area of the park?

Solution: Given that, length of rectangular park = $20\frac{3}{4}$ m

Width of park = $15\frac{1}{2}$ m

Since, area of rectangle = length × width

$= 20\frac{3}{4} \times 15\frac{1}{2}$

We will convert it into improper fraction.

$= \frac{(20\times 4)+3}{4} \times \frac{(15\times 2)+1}{2}$

$$= \frac{80+3}{4} \times \frac{30+1}{2}$$

$$= \frac{83}{4} \times \frac{31}{2}$$

$$= \frac{2573}{8} m^2$$

Now, we will convert it in mixed fraction as follows:

```
         _____
   8  )   2573   ( 321
         24
         _____
          173
           16
          _____
           13
            8
          _____
            5
```

$$\frac{2573}{8} = 321\frac{5}{8} m^2$$

Therefore, area of park $= 321\frac{5}{8} m^2$

Example 10 – Find the area of a square field if its each side is $10\frac{3}{4}$ m long.

Solution: Given that, side of square $= 10\frac{3}{4}$ m

Since, area of square field $= (side)^2$

$$= (10\frac{3}{4})^2$$

$$= 10\frac{3}{4} \times 10\frac{3}{4}$$

We will convert it in improper fraction.

$$= \frac{(10 \times 4)+3}{4} \times \frac{(10 \times 4)+3}{4}$$

$$= \frac{40+3}{4} \times \frac{40+3}{4}$$

$$= \frac{43}{4} \times \frac{43}{4}$$

$$= \frac{1849}{16}$$

Now, we will convert it in mixed fraction as follows:

```
16 ) 1849 ( 115
       16
       ___
       249
        16
        ___
        89
        80
        ___
         9
```

$$\frac{1849}{16} = 115\frac{9}{16} \, m^2$$

Therefore, area of square field $= 115\frac{9}{16} \, m^2$

Example 11 – Priya spends $\frac{3}{5}$ of her income on household expenses and $\frac{1}{7}$ of her income on personal expenses. If her monthly income is Rs 35000, find her monthly savings.

Solution: Given that, total monthly income of priya = Rs 35000

Her household expenses $= \frac{3}{5} \times \overset{7000}{\cancel{35000}} = 7000 \times 3 = Rs\ 21000$

Her personal expenses $= \frac{1}{7} \times \overset{5000}{\cancel{35000}} = Rs\ 5000$

Total expenditure $= Rs(21000 + 5000)$

$= Rs26000$

Therefore, monthly savings = Total income – Total expenditure

$= Rs(35000 - 26000) = Rs\ 9000$

Example 12 – A carton contains 40 boxes of nails and each box weighs $3\frac{3}{4}$ kg. How much would a carton of nails weigh?

Solution: Given that, weight of 1 box = $3\frac{3}{4}$ kg

Numver of boxes in a carton = 40

Therefore, weight of carton = Weight of 40 boxes

$= 40 \times 3\frac{3}{4} = 40 \times \frac{(3\times 4)+3}{4}$

$= 40 \times \frac{12+3}{4}$

$= \overset{10}{\cancel{40}} \times \frac{15}{\cancel{4}}$

$= 150$ kg

Exercise 2.2

Question 1 – Multiply:

(i) $\frac{7}{11}$ by $\frac{3}{5}$

Solution: $\frac{7}{11} \times \frac{3}{5} = \frac{7\times 3}{11\times 5} = \frac{21}{55}$

(ii) $\frac{3}{5}$ by 25

Solution: $\frac{3}{\cancel{5}} \times \frac{\overset{5}{\cancel{25}}}{1} = 15$

(iii) $3\frac{4}{15}$ by 24

Solution: $\frac{(3\times 15)+4}{15} \times 24$

$= \frac{45+4}{15} \times 24$

$= \frac{49}{\underset{5}{\cancel{15}}} \times \overset{8}{\cancel{24}}$

$= \frac{49 \times 8}{5} = \frac{392}{5}$

Now, we will convert it in mixed fraction as follows:

$$
\begin{array}{r}
5 \overline{) 392 } (\; 78 \\
\underline{35} \\
42 \\
\underline{40} \\
2
\end{array}
$$

$\frac{292}{5} = 78\frac{2}{5}$

(iv) $3\frac{1}{8}$ by $4\frac{10}{11}$

Solution: $\frac{(3 \times 8) + 1}{8} \times \frac{(4 \times 11) + 10}{11}$

$= \frac{24 + 1}{8} \times \frac{44 + 10}{11}$

$= \frac{25}{8} \times \frac{54}{11} \quad 27$

4

$= \frac{25 \times 27}{4 \times 11} = \frac{675}{44}$

Now, we will convert it in mixed fraction as follows:

$$
\begin{array}{r}
44 \overline{) 675 } (\; 15 \\
\underline{44} \\
235 \\
\underline{220} \\
15
\end{array}
$$

$\frac{675}{44} = 15\frac{15}{44}$

Question 2 – Find the product:

(i) $\frac{4}{7} \times \frac{14}{25}$

Solution: $\frac{4}{7} \times \frac{14}{25}$

$= \frac{4 \times \overset{2}{\cancel{14}}}{\cancel{7} \times 25}$

$= \frac{4 \times 2}{25} = \frac{8}{25}$

(ii) $7\frac{1}{2} \times 2\frac{4}{15}$

Solution: $\frac{(7 \times 2) + 1}{2} \times \frac{(2 \times 15) + 4}{15}$

$= \frac{14 + 1}{2} \times \frac{30 + 4}{15}$

$= \frac{\cancel{15}}{\cancel{2}} \times \frac{\cancel{34}}{\cancel{15}} \quad 17$

$= 17$

(iii) $3\frac{6}{7} \times 4\frac{2}{3}$

Solution: $\frac{(3 \times 7) + 6}{7} \times \frac{(4 \times 3) + 2}{3}$

$= \frac{21 + 6}{7} \times \frac{12 + 2}{3}$

$\overset{9}{} = \frac{\cancel{27}}{\cancel{7}} \times \frac{\cancel{14}}{\cancel{3}} \quad 2$

$= 9 \times 2$

$= 18$

(iv) $6\frac{11}{14} \times 3\frac{1}{2}$

Solution: $\frac{(6 \times 14) + 11}{14} \times \frac{(3 \times 2) + 1}{2}$

$$= \frac{84+11}{14} \times \frac{6+1}{2}$$

$$= \frac{95}{\cancel{14}} \times \frac{\cancel{7}}{2}$$
2

$$= \frac{95}{4}$$

Now, we will convert it in mixed fraction as follows:

```
4  )  95  ( 23
        8
       ───
        15
        12
       ───
         3
```

$$\frac{95}{4} = 23\frac{3}{4}$$

Question 3 – Simplify:

(i) $\frac{12}{25} \times \frac{15}{28} \times \frac{35}{36}$

Solution: We will simplify this as follows:

$$\overset{\cancel{3} \quad \cancel{3} \quad \cancel{7}}{\frac{\cancel{12}}{\cancel{25}} \times \frac{\cancel{15}}{\cancel{28}} \times \frac{\cancel{35}}{36}}$$

$$\cancel{5} \quad \cancel{4} \quad \cancel{12} \quad 4$$

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

(ii) $\frac{10}{27} \times \frac{39}{56} \times \frac{28}{65}$

Solution: We will simplify this as follows:

$$\frac{\cancel{10}^{2}}{\cancel{27}_{9}} \times \frac{\cancel{39}^{3}}{\cancel{56}_{2}} \times \frac{\cancel{28}^{2}}{\cancel{65}_{5}}$$

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

(iii) $2\frac{2}{17} \times 7\frac{2}{9} \times 1\frac{33}{52}$

Solution: We will convert this into improper fraction as follows:

$$= \frac{(2 \times 17) + 2}{17} \times \frac{(7 \times 9) + 2}{9} \times \frac{(1 \times 52) + 33}{52}$$

$$= \frac{34 + 2}{17} \times \frac{63 + 2}{9} \times \frac{52 + 33}{52}$$

$$\frac{\cancel{36}^{4}}{\cancel{17}} \times \frac{\cancel{65}^{5}}{\cancel{9}} \times \frac{\cancel{85}^{5}}{\cancel{52}_{13}}$$

$$= 25$$

Question 4 – Find:

(i) $\frac{1}{2}$ *of* $4\frac{2}{9}$

Solution: We will calculate - $\frac{1}{2} \times \frac{(4 \times 9) + 2}{9}$

$$= \frac{1}{2} \times \frac{36 + 2}{9}$$

$$= \frac{1}{2} \times \frac{38}{9}$$

$$= \frac{\cancel{38}^{19}}{\cancel{18}_{9}}$$

$$= \frac{19}{9}$$

Now, we will convert it in mixed fraction as follows:

$$9 \overline{) \; 19 \;} (\; 2$$
$$\underline{18}$$
$$1$$

$$\frac{19}{9} = 2\frac{1}{9}$$

(ii) $\frac{5}{8} \; \boldsymbol{of} \; 9\frac{2}{3}$

Solution: We will calculate - $\frac{5}{8} \times \frac{(9\times3)+2}{3}$

$$= \frac{5}{8} \times \frac{27+2}{3}$$

$$= \frac{5}{8} \times \frac{29}{3}$$

$$= \frac{145}{24}$$

Now, we will convert it in mixed fraction as follows:

$$24 \overline{) \; 145 \;} (\; 6$$
$$\underline{144}$$
$$1$$

$$\frac{145}{24} = 6\frac{1}{24}$$

(iii) $\frac{2}{3}$ *of* $\frac{9}{16}$

Solution: We will simplify this as follows:

$= \frac{2}{3} \times \frac{9}{16}$

$= \frac{2 \times 9}{3 \times 16} = \frac{\cancel{18}^{3}}{\cancel{48}_{8}}$

$= \frac{3}{8}$

Question 5 – Which is greater? $\frac{1}{2}$ *of* $\frac{6}{7}$ **Or** $\frac{2}{3}$ *of* $\frac{3}{7}$

Solution: (1) $\frac{1}{2}$ *of* $\frac{6}{7} = \frac{1}{2} \times \frac{6}{7} = \frac{1 \times 6}{2 \times 7} = \frac{6}{14}$

Now, 2 is common factor of 6 and 14. So, we divide each term by 2

$=> \frac{6}{14} = \frac{3}{7}$

(2) $\frac{2}{3}$ *of* $\frac{3}{7} = \frac{2}{3} \times \frac{3}{7} = \frac{2 \times \cancel{3}}{\cancel{3} \times 7} = \frac{2}{7}$

Clearly, $3 > 2$

Thus, $\frac{3}{7} > \frac{2}{7}$

Therefore, $\frac{1}{2}$ *of* $\frac{6}{7}$ is greater than $\frac{2}{3}$ *of* $\frac{3}{7}$

Question 6 – Find:

(i) $\frac{7}{11}$ *of Rs* 330

Solution: We will calculate:

$= \frac{7}{\cancel{11}} \times \cancel{330}^{30}$

$= 7 \times 30$

$= Rs\ 210$

(ii) $\frac{5}{9}$ of 108 metres

Solution: We will calculate:

$= \frac{5}{\cancel{9}} \times \cancel{108}\ ^{12}$

$= 5 \times 12$

$= 60$ metres

(iii) $\frac{3}{7}$ of 42 litres

Solution: We will calculate:

$= \frac{3}{\cancel{7}} \times \cancel{42}\ ^{6}$

$= 3 \times 6$

$= 18$ litres

(iv) $\frac{1}{12}$ of an hour

Solution: We know that 1 hour = 60 minutes

Thus, $\frac{1}{12} \times 60$

$= \frac{\cancel{60}\ ^{5}}{\cancel{12}}$

$= 5$ minutes

(v) $\frac{5}{6}$ of an year

Solution: We know that 1 year = 12 months

Thus, $\frac{5}{6} \times 12 = \frac{5 \times 12}{6}$

$= \frac{\cancel{60}\ ^{10}}{\cancel{6}}$

= 10 months

(vi) $\frac{3}{20}$ **of a kg**

Solution: We know that 1 kg = 1000 grams

Thus, $\frac{3}{20} \times 1000 = \frac{3 \times 1000}{20}$

$= \frac{3000}{20}$ 150

= 150 grams

(vii) $\frac{7}{20}$ **of a litre**

Solution: We know that 1 litre = 1000 mL

Thus, $\frac{7}{20} \times 1000 = \frac{7 \times 1000}{20}$

$= \frac{7000}{20}$ 350

= 350 mL

(viii) $\frac{5}{6}$ **of a day**

Solution: We know that 1 day = 24 hours

Thus, $\frac{5}{6} \times 24 = \frac{5 \times 24}{6}$

$= \frac{120}{6}$ 20

= 20 hours

(ix) $\frac{2}{7}$ **of a week**

Solution: We know that 1 week = 7 days

Thus, $\frac{2}{7} \times 7 = \frac{2 \times 7}{7}$

= 2 days

Question 7 – Shikha plants 5 saplings in a row in her garden. The distance between two adjacent saplings is$\frac{3}{4}$ m. Find the distance between the first and the last sapling.

Solution: It is given that distance between two adjacent saplings = $\frac{3}{4}m$

Total number of sapling in a row = 5

Thus, there are 4 such adjacent pairs of saplings

Therefore, distance between first and last sapling = $\frac{3}{\cancel{4}} \times \cancel{4}$

 = 3 m

Question 8 – Ravish reads $\frac{1}{3}$ part of a book in 1 hour. How much part of the book will he read in $2\frac{1}{5}$ hours?

Solution: Part of book read in 1 hour = $\frac{1}{3}$

Part of book read in $2\frac{1}{5}$ hours = $\frac{1}{3} \times 2\frac{1}{5}$

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

$= \frac{1}{3} \times \frac{10+1}{5}$

$= \frac{1}{3} \times \frac{11}{5}$

$= \frac{11}{15}$

Question 9 – Lipika reads a book for $1\frac{3}{4}$ hours every day. She reads the entire book in 6 days. How many hours in all were required by her to read the book?

Solution: Given that, Lipika reads the entire book in 6 days

Time taken by Lipika to read a book in 1 day $= 1\frac{3}{4}$ hours

Time taken by her to read it in 6 days $= 6 \times 1\frac{3}{4}$

$= 6 \times \frac{(1 \times 4) + 3}{4}$

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

$= \overset{3}{\cancel{6}} \times \frac{7}{\cancel{4}_{2}}$

$= \frac{21}{2}$

Now, we will convert it in mixed fraction as follows:

$$2 \enclose{longdiv}{21}\; (\,10$$
$$\underline{20}$$
$$1$$

$\frac{21}{2} = 10\frac{1}{2}$

Thus, time taken to read the entire book $= 10\frac{1}{2}$ hours

Question 10 – Find the area of a rectangular park which is $41\frac{2}{3}$ m long and $18\frac{3}{5}$ m broad.

Solution: Given that, length of rectangular park $= 41\frac{2}{3}$ m

Width of park $= 18\frac{3}{5}$ m

Since, area of rectangle $=$ length $\times$ width

$= 41\frac{2}{3} \times 18\frac{3}{5}$

We will convert it into improper fraction.

$= \frac{(41 \times 3) + 2}{3} \times \frac{(18 \times 5) + 3}{5}$

$$= \frac{123+2}{3} \times \frac{90+3}{5}$$

$$= \frac{\overset{25}{\cancel{125}}}{\cancel{3}} \times \frac{\overset{31}{\cancel{93}}}{\cancel{5}}$$

$$= \frac{25 \times 31}{1} m^2$$

$$= 775 \ m^2$$

Therefore, area of park $= 775 \ m^2$

Question 11 – If milk is available at Rs $17\frac{3}{4}$ per litre, find the cost of $7\frac{2}{5}$ litres of milk

Solution: Given that, cost of 1 litre of milk = Rs $17\frac{3}{4}$

Thus, cost of $7\frac{2}{5}$ litres of milk $= 17\frac{3}{4} \times 7\frac{2}{5}$

We will first convert it into improper fraction as follows:

$$= \frac{(17 \times 4) + 3}{4} \times \frac{(7 \times 5) + 2}{5}$$

$$= \frac{68+3}{4} \times \frac{35+2}{5}$$

$$= \frac{71}{4} \times \frac{37}{5}$$

$$= \frac{71 \times 37}{4 \times 5}$$

$$= \frac{2627}{20}$$

Now, we will convert it in mixed fraction as follows:

```
        ⌐‾‾‾‾‾‾
20  )  2627  ( 131
        20
       ‾‾‾‾
        627
         60
       ‾‾‾‾
         27
         20
       ‾‾‾‾
          7
```

$$\frac{2627}{20} = 131\frac{7}{20}$$

Thus, cost of $7\frac{2}{5}$ litres of milk = Rs $131\frac{7}{20}$

Question 12 – Sharda can walk $8\frac{1}{3}$ km in one hour. How much distance will she cover in $2\frac{2}{5}$ hours?

Solution: Given that, distance covered by sharda in 1 hour = $8\frac{1}{3}$ km

Thus, distance covered by her in $2\frac{2}{5}$ hours = $8\frac{1}{3} \times 2\frac{2}{5}$

We will first convert it into improper fraction as follows:

$$= \frac{(8\times3)+1}{3} \times \frac{(2\times5)+2}{5}$$

$$= \frac{24+1}{3} \times \frac{10+2}{5}$$

$$= \frac{\overset{5}{\cancel{25}}}{\cancel{3}} \times \frac{\overset{4}{\cancel{12}}}{\cancel{5}}$$

$$= 5 \times 4$$

$$= 20$$

Thus, distance covered by her in $2\frac{2}{5}$ hours = 20 km

Question 13 – A sugar bag contains 30 kg of sugar. After consuming $\frac{2}{3}$ of it, how much sugar is left in the bag?

Solution: Given that, total quantity of sugar in a bag = 30 kg

Consumption of sugar = $\frac{2}{\cancel{3}} \times \cancel{30}^{\,10}$

$$= 2 \times 10$$

$= 20 \text{ kg}$

Therefore, sugar left in bag $= 30 - 20$

$= 10 \text{ kg}$

Question 14 – Each side of a square is $6\frac{2}{3}\ m$ long. Find its area.

Solution: Given that, side of square $= 6\frac{2}{3}$ m

Since, area of square $= (side)^2$

$= (6\frac{2}{3})^2$

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

We will convert it in improper fraction.

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

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

$= \frac{20}{3} \times \frac{20}{3}$

$= \frac{400}{9}$

Now, we will convert it in mixed fraction as follows:

$$
\begin{array}{r}
9\ \overline{)\ 400\ (}\ 44 \\
36 \\
\overline{40} \\
36 \\
\overline{4}
\end{array}
$$

$\frac{400}{9} = 44\frac{4}{9}\ m^2$

Therefore, area of square $= 44\frac{4}{9}\ m^2$

Question 15 – There are 45 students in a class and $\frac{3}{5}$ of them are boys. How many girls are there in the class?

Solution: Given that, total number of students in a class = 45

Number of boys in class $= \frac{3}{5} \times \overset{9}{\cancel{45}}$

$= 3 \times 9$

$= 27$

Thus, number of girls in class $= 45 - 27$

$= 18$

Division of fractions

If $\frac{a}{b}$ and $\frac{c}{d}$ are two fractions, then their division is represented as follows:

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$$

Reciprocal of a fraction: One fraction is reciprocal of other if their product is 1. It is also known as multiplicative inverse.

Examples:

Example 1 – Divide:

(i) $\frac{5}{9}$ by $\frac{2}{3}$

Solution: We will calculate $\frac{5}{9} \div \frac{2}{3}$

It can be written as: $\frac{5}{9} \times \frac{3}{2}$

$= \frac{5 \times \cancel{3}}{\cancel{9} \times 2}$
$\scriptstyle 3$

$= \frac{5}{6}$

(ii) $28 \ by \ \frac{7}{4}$

Solution: We will calculate $28 \div \frac{7}{4}$

It can be written as: $28 \times \frac{4}{7}$

$= \frac{\overset{4}{\cancel{28}} \times 4}{\underset{}{\cancel{7}}}$

$= 4 \times 4$

$= 16$

(iii) $36 \ by \ 6\frac{2}{3}$

Solution: We will calculate $36 \div 6\frac{2}{3}$

We will convert $6\frac{2}{3}$ into improper fraction as follows:

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

Thus, it can be written as: $36 \div \frac{20}{3}$

$= \overset{9}{\cancel{36}} \times \frac{3}{\underset{5}{\cancel{20}}}$

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

$= \frac{27}{5}$

Now, we will convert it in mixed fraction as follows:

$$5 \ \overline{)\ 27\ } (5$$
$$\underline{25}$$
$$2$$

$\frac{27}{5} = 5\frac{2}{5}$

Example 2 – Simplify:

(i) $\frac{4}{9} \div \frac{2}{3}$

Solution - We can write it as:

$$\overset{2}{\underset{3}{\frac{\cancel{4}}{\cancel{9}} \times \frac{\cancel{3}}{\cancel{2}}}}$$

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

(ii) $3\frac{3}{7} \div \frac{8}{21}$

Solution: we will convert $3\frac{3}{7}$ into improper fraction as follows:

$$= \frac{(3 \times 7) + 3}{7} = \frac{21 + 3}{7} = \frac{24}{7}$$

Thus, we have $\frac{24}{7} \div \frac{8}{21}$

Now, we can write it as $\frac{24}{7} \times \frac{21}{8}$

$$= \frac{\overset{3}{\cancel{24}} \times \overset{3}{\cancel{21}}}{\underset{1}{\cancel{7}} \times \cancel{8}}$$

$$= 3 \times 3$$

$$= 9$$

(iii) $15\frac{3}{7} \div 1\frac{23}{49}$

Solution: we will first convert it into improper fraction as follows:

$$= \frac{(15 \times 7) + 3}{7} \div \frac{(1 \times 49) + 23}{49}$$

$$= \frac{105 + 3}{7} \div \frac{49 + 23}{49}$$

$$= \frac{108}{7} \div \frac{72}{49}$$

Now, we can rewrite it as:

$$\frac{\overset{3}{\cancel{108}}}{\cancel{7}} \times \frac{\overset{7}{\cancel{49}}}{\cancel{72}} \quad 2$$

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

$$= \frac{21}{2}$$

Example 3 – Simplify: $\left(\frac{16}{5} \div \frac{8}{20}\right) + \left(\frac{15}{5} \div \frac{3}{35}\right)$

Solution: we will write it as follows:

$$= \left(\frac{\overset{2}{\cancel{16}}}{\cancel{5}} \times \frac{\overset{4}{\cancel{20}}}{\cancel{8}}\right) + \left(\frac{\overset{5}{\cancel{15}}}{\cancel{5}} \times \frac{\overset{7}{\cancel{35}}}{\cancel{3}}\right)$$

$$= (2 \times 4) + (5 \times 7)$$

$$= 8 + 35$$

$$= 43$$

Example 4 – The cost of $5\frac{2}{5}\ kg$ of sugar is $Rs101\frac{1}{4}$, find its cost per kg

Solution: Given that, cost of $5\frac{2}{5}\ kg$ of sugar $= Rs101\frac{1}{4}$

Thus, cost of 1 kg sugar $= Rs(101\frac{1}{4} \div 5\frac{2}{5})$

First, we will convert it into improper fraction as follows:

$$= \frac{(101 \times 4) + 1}{4} \div \frac{(5 \times 5) + 2}{5}$$

$$= \frac{404 + 1}{4} \div \frac{25 + 2}{5}$$

$$= \frac{405}{4} \div \frac{27}{5}$$

Now, we can rewrite it as:

15

$$=\frac{\cancel{105}}{4}\times\frac{5}{\cancel{27}}$$

$$=\frac{15\times5}{4}$$

$$=\frac{75}{4}$$

Now, we will convert it in mixed fraction as follows:

$$4\ \overline{)\ \ 75\ \ }(\ 18$$

$$\underline{\ \ \ 4\ \ \ }$$

$$35$$

$$\underline{\ \ \ 32\ \ \ }$$

$$3$$

$$\frac{75}{4}=18\frac{3}{4}$$

Therefore, cost of 1 kg sugar = $Rs\ 18\frac{3}{4}$

Example 5 – The product of two numbers is $20\frac{5}{7}$. If one of the numbers is $6\frac{2}{3}$, find the other.

Solution: Let the other number be 'x'

It is given that product of two numbers = $20\frac{5}{7}$

One number = $6\frac{2}{3}$

Now, product of two numbers = $20\frac{5}{7}$

$$=> x\times6\frac{2}{3}=20\frac{5}{7}$$

$$=> x=20\frac{5}{7}\div6\frac{2}{3}$$

We will convert it into improper fraction as follows:

$$=> x=\frac{(20\times7)+5}{7}\div\frac{(6\times3)+2}{3}$$

$$\Rightarrow x = \frac{140+5}{7} \div \frac{18+2}{3}$$

$$\Rightarrow x = \frac{145}{7} \div \frac{20}{3}$$

We will now rewrite it as:

$$\Rightarrow x = \frac{\overset{29}{\cancel{145}}}{7} \times \frac{3}{\underset{4}{\cancel{20}}}$$

$$\Rightarrow x = \frac{29 \times 3}{7 \times 4}$$

$$\Rightarrow x = \frac{87}{28}$$

Now, we will convert it in mixed fraction as follows:

$$28 \overline{)\,87\,} (\,3$$
$$\underline{84}$$
$$3$$

$$\frac{87}{28} = 3\frac{3}{28}$$

Therefore, other number $= 3\frac{3}{28}$

Example 6 – By what number should $5\frac{5}{6}$ be multiplied to get $3\frac{1}{3}$?

Solution: Let the required number be 'x'

According to given question,

$$x \times 5\frac{5}{6} = 3\frac{1}{3}$$

$$\Rightarrow x = 3\frac{1}{3} \div 5\frac{5}{6}$$

We will convert it into improper fraction as follows:

$$\Rightarrow x = \frac{(3 \times 3)+1}{3} \div \frac{(5 \times 6)+5}{6}$$

$$=> x = \frac{9+1}{3} \div \frac{30+5}{6}$$

$$=> x = \frac{10}{3} \div \frac{35}{6}$$

We will now rewrite it as:

$$=> x = \frac{\overset{2}{\cancel{10}}}{\cancel{3}} \times \frac{\overset{?}{\cancel{6}}}{\underset{7}{\cancel{35}}}$$

$$=> x = \frac{2 \times 2}{7}$$

$$=> x = \frac{4}{7}$$

Therefore, required number $= \frac{4}{7}$

Example 7 – If the cost of a notebook is Rs$8\frac{3}{4}$, how many notebooks can be purchased for Rs$131\frac{1}{4}$?

Solution: It is given that total cost of notebooks $= Rs131\frac{1}{4}$

Cost of one notebook $= Rs8\frac{3}{4}$

Number of notebooks = Total cost ÷ cost of 1 notebook

$$= Rs(131\frac{1}{4} \div 8\frac{3}{4})$$

We will convert it into improper fraction as follows:

$$= \frac{(131 \times 4) + 1}{4} \div \frac{(8 \times 4) + 3}{4}$$

$$=> x = \frac{524 + 1}{4} \div \frac{32 + 3}{4}$$

$$=> x = \frac{525}{4} \div \frac{35}{4}$$

We will now rewrite it as:

$$= \frac{\overset{15}{\cancel{525}}}{\cancel{4}} \times \frac{\cancel{4}}{\cancel{35}}$$

$$= 15$$

Therefore, number of notebooks = 15

Example 8 – A bucket contains $24\frac{3}{4}$ litres of water. How many $\frac{3}{4}$ litre jugs can be filled from the bucket to get it emptied?

Solution: It is given that, capacity of bucket = $24\frac{3}{4}$ litres

Capacity of 1 jug = $\frac{3}{4}$

Number of such jugs can be filled from the bucket = capacity of bucket ÷ capacity of 1 jug

$$= 24\frac{3}{4} \div \frac{3}{4}$$

We will convert it into improper fraction as follows:

$$= \frac{(24 \times 4) + 3}{4} \div \frac{3}{4}$$

$$= \frac{96 + 3}{4} \div \frac{3}{4}$$

$$= \frac{99}{4} \div \frac{3}{4}$$

Now, we can rewrite it as:

$$= \frac{\overset{33}{\cancel{99}}}{\cancel{4}} \times \frac{\cancel{4}}{\cancel{3}}$$

$$= 33$$

Therefore, number of jugs = 33

Exercise 2.3

Question 1 – Find the reciprocal of each of the following fractions and classify them as proper, improper and whole numbers:

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

Solution: The reciprocal of $\frac{3}{7}$ is $\frac{7}{3}$

It is improper fraction as numerator is greater than denominator.

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

Solution: The reciprocal of $\frac{5}{8}$ is $\frac{8}{5}$

It is improper fraction as numerator is greater than denominator.

(iii) $\frac{9}{7}$

Solution: The reciprocal of $\frac{9}{7}$ is $\frac{7}{9}$

It is proper fraction as numerator is less than denominator.

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

Solution: The reciprocal of $\frac{6}{5}$ is $\frac{5}{6}$

It is proper fraction as numerator is less than denominator.

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

Solution: The reciprocal of $\frac{12}{7}$ is $\frac{7}{12}$

It is proper fraction as numerator is less than denominator.

(vi) $\frac{1}{8}$

Solution: The reciprocal of $\frac{1}{8}$ is $\frac{8}{1} = 8$

It is a whole number.

Question 2 – Divide:

(i) $\frac{3}{8}$ **by** $\frac{5}{9}$

Solution: We will calculate $\frac{3}{8} \div \frac{5}{9}$

It can be written as: $\frac{3}{8} \times \frac{9}{5}$

$= \frac{3 \times 9}{8 \times 5}$

$= \frac{27}{40}$

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

Solution: We will calculate $3\frac{1}{4} \div \frac{2}{3}$

We will convert it in improper fraction as follows:

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

$= \frac{12 + 1}{4} \div \frac{2}{3}$

$= \frac{13}{4} \div \frac{2}{3}$

It can be written as: $\frac{13}{4} \times \frac{3}{2}$

$= \frac{13 \times 3}{4 \times 2}$

$= \frac{39}{8}$

Now, we will convert it in mixed fraction as follows:

$$8 \overline{)\ 39\ } (4$$
$$\underline{32}$$
$$7$$

$\frac{87}{28} = 4\frac{7}{8}$

(iii) $\frac{7}{8}$ **by** $4\frac{1}{2}$

Solution: We will calculate $\frac{7}{8} \div 4\frac{1}{2}$

We will convert it in improper fraction as follows:

$= \frac{7}{8} \div \frac{(4\times2)+1}{2}$

$= \frac{7}{8} \div \frac{8+1}{2}$

$= \frac{7}{8} \div \frac{9}{2}$

It can be written as: $\frac{7}{8} \times \frac{2}{9}$

$= \frac{7\times2}{8\times9}$

4

$= \frac{7}{36}$

(iv) $6\frac{1}{4}$ **by** $2\frac{3}{5}$

Solution: We will calculate $6\frac{1}{4} \div 2\frac{3}{5}$

We will convert it in improper fraction as follows:

$= \frac{(6\times4)+1}{4} \div \frac{(2\times5)+3}{5}$

$= \frac{24+1}{4} \div \frac{10+3}{5}$

$= \frac{25}{4} \div \frac{13}{5}$

It can be written as: $\frac{25}{4} \times \frac{5}{13}$

$= \frac{25 \times 5}{4 \times 13}$

$= \frac{125}{52}$

Now, we will convert it in mixed fraction as follows:

$$52 \overline{)\,125\,} (\,2$$
$$\underline{104}$$
$$21$$

$\frac{125}{52} = 2\frac{21}{52}$

Question 3 – Divide:

(i) $\frac{3}{8}$ by 4

Solution: We will calculate $\frac{3}{8} \div 4$

It can be written as: $\frac{3}{8} \times \frac{1}{4}$

$= \frac{3 \times 1}{8 \times 4}$

$= \frac{3}{32}$

(ii) $\frac{9}{16}$ by 6

Solution: We will calculate $\frac{9}{16} \div 6$

It can be written as: $\frac{9}{16} \times \frac{1}{6}$

$= \frac{\overset{3}{\cancel{9}} \times 1}{16 \times \underset{2}{\cancel{6}}}$

$= \dfrac{3}{32}$

(iii) $9\ by\ \dfrac{3}{16}$

Solution: We will calculate $9 \div \dfrac{3}{16}$

It can be written as: $9 \times \dfrac{16}{3}$

$= \dfrac{\overset{3}{\cancel{9} \times 16}}{\cancel{3}}$

$= 3 \times 16$

$= 48$

(iv) $10\ by\ \dfrac{100}{3}$

Solution: We will calculate $10 \div \dfrac{100}{3}$

It can be written as: $10 \times \dfrac{3}{100}$

$= \dfrac{\cancel{10} \times 3}{\cancel{100}}\ \ 10$

$= \dfrac{3}{10}$

Question 4 - Simplify:

(i) $\dfrac{3}{10} \div \dfrac{10}{3}$

Solution - We can write it as:

$= \dfrac{3}{10} \times \dfrac{3}{10}$

$= \dfrac{9}{100}$

(ii) $4\frac{3}{5} \div \frac{4}{5}$

Solution: we will convert $4\frac{3}{5}$ into improper fraction as follows:

$= \frac{(4\times5)+3}{5} = \frac{20+3}{5} = \frac{23}{5}$

Thus, we have $\frac{23}{5} \div \frac{4}{5}$

Now, we can write it as $\frac{23}{5} \times \frac{5}{4}$

$= \frac{23}{4}$

Now, we will convert it in mixed fraction as follows:

$$4 \enclose{longdiv}{23} (5$$
$$\underline{20}$$
$$3$$

Thus, $\frac{23}{4} = 5\frac{3}{4}$

(iii) $5\frac{4}{7} \div 1\frac{3}{10}$

Solution: we will first convert it into improper fraction as follows:

$= \frac{(5\times7)+4}{7} \div \frac{(1\times10)+3}{10}$

$= \frac{35+4}{7} \div \frac{10+3}{10}$

$= \frac{39}{7} \div \frac{13}{10}$

Now, we can rewrite it as:

$= \frac{\overset{3}{\cancel{39}}}{7} \times \frac{10}{\cancel{13}}$

$= \frac{3\times10}{7}$

$$= \frac{30}{7}$$

Now, we will convert it in mixed fraction as follows:

$$7 \overline{)\ 30\ }(\ 4$$
$$\underline{28}$$
$$2$$

Thus, $\frac{30}{7} = 4\frac{2}{7}$

(iv) $4 \div 2\frac{2}{5}$

Solution: we will convert $2\frac{2}{5}$ into improper fraction as follows:

$$= \frac{(2\times 5)+2}{5} = \frac{10+2}{5} = \frac{12}{5}$$

Thus, we have $4 \div \frac{12}{5}$

Now, we can write it as $\frac{4}{1} \times \frac{5}{12}$

$$= \frac{\cancel{4}\times 5}{1\times \cancel{12}\ \ 3}$$

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

Now, we will convert it in mixed fraction as follows:

$$3 \overline{)\ 5\ }(\ 1$$
$$\underline{3}$$
$$2$$

Thus, $\frac{5}{3} = 1\frac{2}{3}$

Question 5 – A wire of length $12\frac{1}{2}\ m$ is cut into 10 pieces of equal length. Find the length of each piece.

Solution: It is given that total length of wire $= 12\frac{1}{2}\ m$

Number of pieces of wire = 10

Length of each piece = total length ÷ number of pieces

$$= 12\frac{1}{2} \div 10$$

We will convert $12\frac{1}{2}$ into improper fraction as follows:

$$= \frac{(12\times2)+1}{2} = \frac{24+1}{2} = \frac{25}{2}$$

Thus, we have $\frac{25}{2} \div 10$

Now, we can write it as $\frac{25}{2} \times \frac{1}{10}$

$$= \frac{\overset{5}{\cancel{25}}\times1}{2\times\cancel{10}\,_2}$$

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

Now, we will convert it in mixed fraction as follows:

$$4\overline{)5}(1$$
$$\underline{4}$$
$$1$$

Thus, length of each piece $= \frac{5}{4} = 1\frac{1}{4}$

Question 6 – The length of a rectangular plot of area $65\frac{1}{3}m^2$ is $12\frac{1}{4}$ m. What is the width of the plot?

Solution: It is given that area of rectangular plot $= 65\frac{1}{3}m^2$

Length of plot $= 12\frac{1}{4}$ m

We know that, area of rectangle = length × width

Thus, width = area ÷ length

$$= 65\frac{1}{3} \div 12\frac{1}{4}$$

We will convert it into improper fraction as follows:

$$= \frac{(65 \times 3) + 1}{3} \div \frac{(12 \times 4) + 1}{4}$$

$$= \frac{195 + 1}{3} \div \frac{48 + 1}{4}$$

$$= \frac{196}{3} \div \frac{49}{4}$$

We will now rewrite it as:

$$= \frac{\overset{4}{\cancel{196}}}{3} \times \frac{4}{\cancel{49}}$$

$$= \frac{16}{3}$$

Now, we will convert it in mixed fraction as follows:

$$
\begin{array}{r}
3 \overline{) 16 } (5 \\
\underline{15} \\
1
\end{array}
$$

Thus, width of plot $= \frac{16}{3} = 5\frac{1}{3} m$

Question 7 – By what number should $6\frac{2}{9}$ be multiplied to get $4\frac{4}{9}$?

Solution: Let the required number be 'x'

According to given question,

$$x \times 6\frac{2}{9} = 4\frac{4}{9}$$

$$=> x = 4\frac{4}{9} \div 6\frac{2}{9}$$

We will convert it into improper fraction as follows:

$$=> x = \frac{(4 \times 9) + 4}{9} \div \frac{(6 \times 9) + 2}{9}$$

$=> x = \dfrac{36+4}{9} \div \dfrac{54+2}{9}$

$=> x = \dfrac{40}{9} \div \dfrac{56}{9}$

We will now rewrite it as:

$=> x = \dfrac{\overset{5}{\cancel{40}}}{\cancel{9}} \times \dfrac{\cancel{9}}{\underset{7}{\cancel{56}}}$

$=> x = \dfrac{5}{7}$

Therefore, required number $= \dfrac{5}{7}$

Question 8 – The product of two numbers is $25\dfrac{5}{6}$. If one of the numbers is $6\dfrac{2}{3}$, find the other.

Solution: Let the other number be 'x'

It is given that product of two numbers $= 25\dfrac{5}{6}$

One number $= 6\dfrac{2}{3}$

Now, product of two numbers $= 25\dfrac{5}{6}$

$=> x \times 6\dfrac{2}{3} = 25\dfrac{5}{6}$

$=> x = 25\dfrac{5}{6} \div 6\dfrac{2}{3}$

We will convert it into improper fraction as follows:

$=> x = \dfrac{(25\times6)+5}{6} \div \dfrac{(6\times3)+2}{3}$

$=> x = \dfrac{150+5}{6} \div \dfrac{18+2}{3}$

$=> x = \dfrac{155}{6} \div \dfrac{20}{3}$

We will now rewrite it as:

$$\Rightarrow x = \frac{\overset{31}{\cancel{155}}}{\underset{2}{\cancel{6}}} \times \frac{\overset{}{\cancel{3}}}{\underset{4}{\cancel{20}}}$$

$$\Rightarrow x = \frac{31 \times 1}{2 \times 4}$$

$$\Rightarrow x = \frac{31}{8}$$

Now, we will convert it in mixed fraction as follows:

$$8 \overline{) 31 \, (\; 3}$$
$$\underline{24}$$
$$7$$

$\frac{31}{8} = 3\frac{7}{8}$

Therefore, other number $= 3\frac{7}{8}$

Question 9 – The cost of $6\frac{1}{4}$ kg of apples is Rs400. At what rate per kg are the apples being sold?

Solution: It is given that cost of $6\frac{1}{4}$ kg apples = Rs 400

Thus, cost of 1 kg apple $= Rs\left(400 \div 6\frac{1}{4}\right)$

First, we will convert it into improper fraction as follows:

$$= 400 \div \frac{(6 \times 4)+1}{4}$$

$$= 400 \div \frac{24+1}{4}$$

$$= 400 \div \frac{25}{4}$$

Now, we can rewrite it as:

$$= \overset{16}{\cancel{400}} \times \frac{4}{\cancel{25}}$$

$$= 16 \times 4$$

$$= 64$$

Therefore, cost of 1 kg apples = *Rs* 64

Question 10 – By selling oranges at the rate of Rs $5\frac{1}{4}$ per orange, a fruit-seller gets Rs 630. How many dozens of oranges does he sell?

Solution: It is given that cost of 1 orange = Rs $5\frac{1}{4}$

Total money earned by fruit-seller by selling oranges = Rs 630

Number of oranges = $630 \div 5\frac{1}{4}$

First, we will convert it into improper fraction as follows:

$$= 630 \div \frac{(5 \times 4) + 1}{4}$$

$$= 630 \div \frac{20 + 1}{4}$$

$$= 630 \div \frac{21}{4}$$

Now, we can rewrite it as:

$$= \overset{30}{\cancel{630}} \times \frac{4}{\cancel{21}}$$

$$= 30 \times 4$$

$$= 120$$

Therefore, number of oranges = 120

Now, since 1 dozen = 12

Thus, number of dozens of oranges $= \frac{120}{12} = 10$ dozens

Question 11 – In mid-day meal scheme $\frac{3}{10}$ litre of milk is given to each student of a primary school. If 30 litres of milk is distributed every day in the school, how many students are there in the school?

Solution: It is given that quantity of milk given to each student $= \frac{3}{10}$ litres

Total quantity of milk distributed = 30 litres

Thus, number of students = total quantity of milk ÷ quantity of milk each student is getting

$= 30 \div \frac{3}{10}$

We can rewrite it as follows:

$$= \overset{10}{\cancel{30}} \times \frac{10}{\cancel{3}}$$

$= 10 \times 10$

$= 100$

Therefore, number of students = 100

Question 12 – In a charity show Rs 6496 were collected by selling some tickets. If the price of each ticket was Rs $50\frac{3}{4}$, how many tickets were sold?

Solution: It is given that total amount of money collected in show = Rs 6496

Price of one ticket = Rs $50\frac{3}{4}$

Number of tickets = Total amount ÷ price of 1 ticket

$= 6496 \div 50\frac{3}{4}$

First, we will convert it into improper fraction as follows:

$$= 6496 \div \frac{(50 \times 4) + 3}{4}$$

$$= 6496 \div \frac{200 + 3}{4}$$

$$= 6496 \div \frac{203}{4}$$

Now, we can rewrite it as:

$$= \overset{32}{\cancel{6496}} \times \frac{4}{\cancel{203}}$$

$$= 32 \times 4$$

$$= 128$$

Therefore, number of tickets sold = 128

Objective type questions

Question 1 – If a fraction $\frac{a}{b}$ is a lowest terms, then HCF of 'a' and 'b' is?

Solution: HCF of 'a' and 'b' is 1 because a fraction $\frac{a}{b}$ is said to be in lowest terms when 'a' and 'b' are relatively prime or they do not have any factor in common.

Question 2 – The fraction $\frac{84}{98}$ in its lowest terms is?

Solution: We have $- \frac{84}{98}$

We see that 14 is common factor of 84 and 98.

Thus, we divide each by 14 as follows:

$$= \frac{84 \div 14}{98 \div 14} = \frac{6}{7}$$

Question 3 – Which of the following is a vulgar fraction?

(a) 7/10   (b) 13/1000   (c) $2\frac{9}{10}$ (d) 7/9

Solution: 7/9 is a vulgar fraction.

Question 4 – Which of the following fraction is an irreducible (or in its lowest terms)?

(a) 91/104   (b) 105/112   (c) 51/85   (d) 43/83

Solution: 43/83 is an irreducible fraction because 43 and 83 do not have any factor in common.

Question 5 – Which of the following is a proper fraction?

(a) 13/17   (b) 17/13   (c) 12/5   (d) $1\frac{3}{4}$

Solution: Since proper fraction is one in which numerator is less than denominator. Thus $\frac{13}{17}$ is a proper fraction.

Question 6 – The reciprocal of the fraction $2\frac{3}{5}$ is?

Solution: First, we will convert $2\frac{3}{5}$ into improper fraction as follows:

$$= \frac{(2\times5)+3}{5} = \frac{10+3}{5} = \frac{13}{5}$$

Now, reciprocal of $\frac{13}{5}$ is $\frac{5}{13}$

Question 7 – $4\frac{1}{3} - 2\frac{1}{3} =$?

Solution: We will first convert this into improper fraction as follows:

$$= \frac{(4\times3)+1}{3} - \frac{(2\times3)+1}{3}$$

$$= \frac{12+1}{3} - \frac{6+1}{3}$$

$$= \frac{13}{3} - \frac{7}{3}$$

$$= \frac{13-7}{3} = \frac{6}{3} = 2$$

Question 8 – $2\frac{3}{5} \div \frac{5}{7}$ =?

Solution: We will first convert $2\frac{3}{5}$ into improper fraction as follows:

$$= \frac{(2\times5)+3}{5} = \frac{10+3}{5} = \frac{13}{5}$$

Now, we have, $\frac{13}{5} \div \frac{5}{7}$

$$= \frac{13}{5} \times \frac{7}{5}$$

$$= \frac{91}{25}$$

Question 9 – By what number should $1\frac{3}{4}$ be divided to get $2\frac{1}{2}$?

Solution: Let the required number be 'x'

Then, $1\frac{3}{4} \div x = 2\frac{1}{2}$

First, we will convert this into improper fraction as follows:

$$=> \frac{(1\times4)+3}{4} \div x = \frac{(2\times2)+1}{2}$$

$$=> \frac{4+3}{4} \div x = \frac{4+1}{2}$$

$$=> \frac{7}{4} \div x = \frac{5}{2}$$

$$=> \frac{7}{4} \times \frac{1}{x} = \frac{5}{2}$$

$$=> \frac{7}{4x} = \frac{5}{2}$$

By cross multiplication, we get

$$=> 20x = 14$$

$$=> x = \frac{14}{20} = \frac{7}{10}$$

Thus, required number is $\frac{7}{10}$

Question 10 – By what number $4\frac{3}{5}$ be multiplied to get $2\frac{3}{7}$?

Solution: Let the required number be 'x'

According to given question,

$$x \times 4\frac{3}{5} = 2\frac{3}{7}$$

$$=> x = 2\frac{3}{7} \div 4\frac{3}{5}$$

We will convert it into improper fraction as follows:

$$=> x = \frac{(2\times7)+3}{7} \div \frac{(4\times5)+3}{5}$$

$$=> x = \frac{14+3}{7} \div \frac{20+3}{5}$$

$$=> x = \frac{17}{7} \div \frac{23}{5}$$

We will now rewrite it as:

$$=> x = \frac{17}{3} \times \frac{5}{23}$$

$$=> x = \frac{85}{69}$$

Therefore, required number $= \frac{85}{69}$

Question 11: $\left(5\frac{1}{4} - 3\frac{1}{3}\right) = ?$

Solution: We will first convert this into improper fraction as follows:

$$=> \frac{(5\times4)+1}{4} - \frac{(3\times3)+1}{3}$$

$$\Rightarrow \frac{20+1}{4} - \frac{9+1}{3} = \frac{21}{4} - \frac{10}{3}$$

Now, we take LCM of (4 and 3) which is 12.

$$\Rightarrow \frac{(21\times3)-(10\times4)}{12} = \frac{63-40}{12} = \frac{23}{12}$$

Now, we will convert it in mixed fraction as follows:

$$
\begin{array}{r}
12 \overline{)\ 23\ } (\ 1 \\
\underline{12} \\
11
\end{array}
$$

$$\frac{23}{12} = 1\frac{11}{12}$$

Question 12 – The fraction equivalent to $1\frac{2}{3}$ be?

Solution: We will convert $1\frac{2}{3}$ into improper fraction as follows:

$$\Rightarrow \frac{(1\times3)+2}{3} = \frac{3+2}{3} = \frac{5}{3}$$

If we multiply each term by 2, we get

$$\Rightarrow \frac{5\times2}{3\times2} = \frac{10}{6}$$

Thus, fraction equivalent to $1\frac{2}{3}$ be $\frac{10}{6}$

Question 13 – By what number $9\frac{4}{5}$ is multiplied to get 42?

Solution: Let the required number be 'x'

According to given question,

$$x \times 9\frac{4}{5} = 42$$

$$\Rightarrow x = 42 \div 9\frac{4}{5}$$

We will convert it into improper fraction as follows:

$$\Rightarrow x = 42 \div \frac{(9 \times 5) + 4}{5}$$

$$\Rightarrow x = 42 \div \frac{45 + 4}{5}$$

$$\Rightarrow x = 42 \div \frac{49}{5}$$

We will now rewrite it as:

$$\Rightarrow x = \overset{6}{\cancel{42}} \times \frac{5}{\underset{7}{\cancel{49}}}$$

$$\Rightarrow x = \frac{30}{7}$$

Therefore, required number $= \frac{30}{7}$

Question 14 – Which of the following statements is true?

(a) $\frac{7}{12} < \frac{4}{21}$ (b) $\frac{7}{12} = \frac{4}{21}$ (c) $\frac{7}{12} > \frac{4}{21}$ (d) **None of these**

Solution: First we convert these fractions into equivalent fraction as follows:

We take LCM of (12 and 21) which is 84

$$\frac{7}{12} = \frac{7 \times 7}{12 \times 7} = \frac{49}{84}$$

$$\Rightarrow \frac{4}{21} = \frac{4 \times 4}{21 \times 4} = \frac{16}{84}$$

Clearly, $49 > 16$

Thus, $\frac{49}{84} > \frac{16}{84}$

$$\Rightarrow \frac{7}{12} > \frac{4}{21}$$

Question 15 – Which one of the following is the correct statement?

(a) $\frac{3}{4} < \frac{2}{3} < \frac{12}{15}$

(b) $\frac{2}{3} < \frac{3}{4} < \frac{12}{15}$

(c) $\frac{2}{3} < \frac{12}{15} < \frac{3}{4}$

(d) $\frac{12}{15} < \frac{2}{3} < \frac{3}{4}$

Solution: First we will make them equivalent fractions by taking LCM of (3, 15 and 4) which is 60.

$$\frac{3}{4} = \frac{3 \times 15}{4 \times 15} = \frac{45}{60}$$

$$\frac{2}{3} = \frac{2 \times 20}{3 \times 20} = \frac{40}{60}$$

$$\frac{12}{15} = \frac{12 \times 4}{15 \times 4} = \frac{48}{60}$$

Clearly, $40 < 45 < 48$

Thus, $\frac{40}{60} < \frac{45}{60} < \frac{48}{60}$

$\Rightarrow \frac{2}{3} < \frac{3}{4} < \frac{12}{15}$

Question 16 – Which of the following fractions lies between $\frac{2}{3}$ and $\frac{5}{7}$?

(a) $\frac{3}{4}$

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

(c) $\frac{5}{6}$

(d) None of these

Solution: Since $\frac{2}{3} = 0.67$ and $\frac{5}{7} = 0.71$

Now, $\frac{3}{4} = 0.75$

$$\frac{4}{5} = 0.8$$

$$\frac{5}{6} = 0.83$$

We can see that none of these are lying between 0.67 and 0.71

Thus, answer is none of these.

Question 17 – Which one of the following is true?

(a) $\frac{1}{2} < \frac{9}{13} < \frac{3}{4} < \frac{12}{17}$

(b) $\frac{3}{4} < \frac{9}{13} < \frac{1}{2} < \frac{12}{17}$

(c) $\frac{1}{2} < \frac{3}{4} < \frac{9}{13} < \frac{12}{17}$

(d) $\frac{1}{2} < \frac{9}{13} < \frac{12}{17} < \frac{3}{4}$

Solution: First we will make them equivalent fractions by taking LCM of (2, 13, 4 and 17) which is 884.

$$\frac{1}{2} = \frac{1 \times 442}{2 \times 442} = \frac{442}{884}$$

$$\frac{9}{13} = \frac{9 \times 68}{13 \times 68} = \frac{612}{884}$$

$$\frac{3}{4} = \frac{3 \times 221}{4 \times 221} = \frac{663}{884}$$

$$\frac{12}{17} = \frac{12 \times 52}{17 \times 52} = \frac{624}{884}$$

Clearly, $442 < 612 < 624 < 663$

Thus, $\frac{442}{884} < \frac{612}{884} < \frac{624}{884} < \frac{663}{884}$

$\Rightarrow \frac{1}{2} < \frac{9}{13} < \frac{12}{17} < \frac{3}{4}$

Question 18 – The smallest of the fractions $\frac{2}{3}, \frac{4}{7}, \frac{8}{11}$ and $\frac{5}{9}$ is?

Solution: First, we will make these fractions as equivalent fractions by taking LCM of (3, 7, 11 and 9) which is 693

$$\frac{2}{3} = \frac{2 \times 231}{3 \times 231} = \frac{462}{693}$$

$$\frac{4}{7} = \frac{4 \times 99}{7 \times 99} = \frac{396}{693}$$

$$\frac{8}{11} = \frac{8 \times 63}{11 \times 63} = \frac{504}{693}$$

$$\frac{5}{9} = \frac{5 \times 77}{9 \times 77} = \frac{385}{693}$$

Clearly, $385 < 396 < 462 < 504$

Thus, $\frac{385}{693} < \frac{396}{693} < \frac{462}{693} < \frac{504}{693}$

$=> \frac{5}{9} < \frac{4}{7} < \frac{2}{3} < \frac{8}{11}$

Therefore $\frac{5}{9}$ is the smallest fraction

Question 19: $9 \times \left(-\frac{1}{3}\right) \times (-3) \times \left(-\frac{1}{9}\right) =?$

Solution: We have,

$$\cancel{9} \times \left(-\frac{1}{\cancel{3}}\right) \times (\cancel{-3}) \times \left(-\frac{1}{\cancel{9}}\right)$$

= -1 (since negative sign is occurring odd number of times)

Question 20 – Which of the following is correct?

(a) $\frac{2}{3} < \frac{3}{5} < \frac{11}{15}$

(b) $\frac{3}{5} < \frac{2}{3} < \frac{11}{15}$

(c) $\frac{11}{15} < \frac{3}{5} < \frac{2}{3}$

(d) $\frac{3}{5} < \frac{11}{15} < \frac{2}{3}$

Solution: First, we will make these fractions as equivalent fractions by taking LCM of (15, 5 and 3) which is 15

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

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

$$\frac{11}{15} = \frac{11 \times 1}{15 \times 1} = \frac{11}{15}$$

Clearly, $9 < 10 < 11$

Thus, $\frac{9}{15} < \frac{10}{15} < \frac{11}{15}$

$$=> \frac{3}{5} < \frac{2}{3} < \frac{11}{15}$$

Question 21 – Which is the smallest of the following fractions?

(a) $\frac{4}{9}$

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

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

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

Solution: First, we will make them equivalent fractions by taking LCM of (9, 5, 7 and 4) which is 1260

$$\frac{4}{9} = \frac{4 \times 140}{9 \times 140} = \frac{560}{1260}$$

$$\frac{2}{5} = \frac{2 \times 252}{5 \times 252} = \frac{504}{1260}$$

$$\frac{3}{7} = \frac{3 \times 180}{7 \times 180} = \frac{540}{1260}$$

$$\frac{1}{4} = \frac{1 \times 140}{4 \times 140} = \frac{315}{1260}$$

Clearly, $315 < 504 < 540 < 560$

$$=> \frac{315}{1260} < \frac{504}{1260} < \frac{540}{1260} < \frac{560}{1260}$$

$$=> \frac{1}{4} < \frac{2}{5} < \frac{3}{7} < \frac{4}{9}$$

Thus $\frac{1}{4}$ is the smallest

Question 22 – The difference between the greatest and the least fractions out of $\frac{6}{7}, \frac{7}{8}, \frac{8}{9}$ and $\frac{9}{10}$ is?

Solution: First, we will make them equivalent fractions by taking LCM of (7, 8, 9 and 10) which is 2520

$$\frac{6}{7} = \frac{6 \times 360}{7 \times 360} = \frac{2160}{2520}$$

$$\frac{7}{8} = \frac{7 \times 315}{8 \times 315} = \frac{2205}{2520}$$

$$\frac{8}{9} = \frac{8 \times 280}{9 \times 280} = \frac{2240}{2520}$$

$$\frac{9}{10} = \frac{9 \times 252}{10 \times 252} = \frac{2268}{2520}$$

Clearly, $2160 < 2205 < 2240 < 2268$

$$=> \frac{2160}{2520} < \frac{2205}{2520} < \frac{2240}{2520} < \frac{2268}{2520}$$

$$=> \frac{6}{7} < \frac{7}{8} < \frac{8}{9} < \frac{9}{10}$$

Least fraction $= \frac{6}{7}$

Greatest fraction $= \frac{9}{10}$

Difference $= \frac{9}{10} - \frac{6}{7}$

$=> \frac{9-60}{10} = \frac{3}{70}$

Question 23 – Which of the following fractions is greater than $\frac{3}{4}$ and less than$\frac{5}{6}$?

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

    (b) $\frac{1}{2}$

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

    (d) $\frac{9}{10}$

Solution: It is clear that $\frac{4}{5}$ is the fraction which is greater than $\frac{3}{4}$ and less than $\frac{5}{6}$

$=> \frac{3}{4} < \frac{4}{5} < \frac{5}{6}$

Question 24 – Which of the following fractions is more than one-third?

    (a) $\frac{23}{70}$

    (b) $\frac{205}{819}$

    (c) $\frac{26}{75}$

    (d) $\frac{118}{335}$

Solution: Consider $\frac{23}{70} \, and \, \frac{1}{3}$

LCM of (70 and 3) is 210

$$\frac{23}{70} = \frac{23 \times 3}{70 \times 3} = \frac{69}{210}$$

$$\frac{1}{3} = \frac{1 \times 70}{3 \times 70} = \frac{70}{210}$$

Clearly, $70 > 69$

$\Rightarrow \frac{1}{3} > \frac{23}{70}$

Consider $\frac{205}{819}$ and $\frac{1}{3}$

LCM of (819 and 3) is 819

$$\frac{205}{819} = \frac{205 \times 1}{819 \times 1} = \frac{205}{819}$$

$$\frac{1}{3} = \frac{1 \times 273}{3 \times 273} = \frac{273}{819}$$

Clearly, $273 > 205$

$\Rightarrow \frac{1}{3} > \frac{205}{819}$

Consider $\frac{26}{75}$ and $\frac{1}{3}$

LCM of (75 and 3) is 75

$$\frac{26}{75} = \frac{26 \times 1}{75 \times 1} = \frac{26}{75}$$

$$\frac{1}{3} = \frac{1 \times 25}{3 \times 25} = \frac{25}{75}$$

Clearly, $26 > 25$

$\Rightarrow \frac{26}{75} > \frac{1}{3}$

Therefore, $\frac{26}{75}$ is more than one-third