Fractions

IMPORTANT POINTS

I. FRACTION :

A fraction is a quantity which expresses a part of the whole.

$$\text{FRACTION} = \frac{\text{Numerator}}{\text{Denominator}}$$

Type of Fractions :

1. **Proper Fraction :** A fraction, whose numerator is less than its denominator, is called a proper fraction.e.g., $\frac{3}{5}, \frac{4}{6}$ etc.

2. **Improper Fraction :** A fraction, whose numerator is greater than or equal to its denominator, is called an improper fraction. e.g., $\frac{8}{6}, \frac{24}{13}, \frac{2}{2}, \frac{3}{3}, \frac{6}{6}$ etc.

3. **Mixed Fraction :** A mixed fraction consists of two parts:

   (i) an integer and (ii) a proper fraction

   e.g., $5\frac{2}{3}$ is a mixed fraction, consisting of an integer (5) and a proper fraction $\left(\frac{2}{3}\right)$.

4. **Like and Unlike Fractions :** Fraction having the same denominator but different numerators are called unlike fractions e.g., $\frac{2}{5}, \frac{1}{5}, \frac{3}{5}, \frac{7}{5}$ etc. are like fractions.

   If denominator of the given fractions are not same, the fractions are called unlike fractions e.g., $\frac{1}{4}, \frac{3}{8}, \frac{6}{9}, \frac{7}{10}$ etc.

5. **Equivalent Fractions :** If two or more fractions have the same value, they are called equivalent or equal fractions.

   e.g., $\frac{1}{2}, \frac{2}{4}, \frac{6}{12}, \frac{8}{16}$ etc. are equivalent fractions as $\frac{1}{2} = \frac{2}{4} = \frac{6}{12} = \frac{8}{16}$.

CONVERTION OF FRACTIONS :

(i) **Mixed Fraction into an Improper Fraction :–** Multiply the integral part by the denominator and to this product add the numerator e.g., $2\frac{5}{15}$

the required improper fraction $= \frac{2 \times 15 + 5}{15} = \frac{35}{15}$

(ii) **Improper Fraction into Mixed Fraction :–** Divide numerator by the denominator. The quotient of this division is the integral part and the remainder obtained is numerator of the required mixed fraction.

For example : $\dfrac{23}{3}=$ Quotient $\dfrac{\text{Remainder}}{\text{Numerator}}=7\dfrac{2}{3}$

(iii) **Unlike Fraction into Like Fractions:**

(1) Find L.C.M. of the denominators of all given fractions.

(2) Divide L.C.M. by the denominator and multiply the quotient to numerator and denominator of fraction.

$$\text{e.g., } \frac{2}{7}, \frac{3}{5} \text{ and } \frac{1}{3}$$

L.C.M. of denominator 7, 5, 3 = 105

Now, in $\dfrac{2}{7}$ dividing L.C.M. by 7 Quotient = 15

$$\therefore \frac{2\times 15}{7\times 15}=\frac{30}{105}$$

$\dfrac{3}{5}$ dividing L.C.M. by 5 Quotient = 21

$$\therefore \frac{3\times 21}{5\times 21}=\frac{63}{105}$$

$\dfrac{1}{3}$ dividing L.C.M. by 3 Quotient = 35

$$\therefore \frac{1\times 35}{3\times 35}=\frac{35}{105}$$

$$\therefore \frac{2}{7}, \frac{3}{5} \text{ and } \frac{1}{3}=\frac{30}{105}, \frac{63}{105} \text{ and } \frac{35}{103}$$

EXERCISE 14(A)

Question 1.
For each expression, given below, write a fraction :
(i) 2 out of 7 = ………..
(ii) 5 out of 17 = ………..
(iii) three-fifths = ………
Solution:
(i) 2 out of 7 = $\frac{2}{7}$
(ii) 5 out of 17 = $\frac{5}{17}$
(iii) three-fifths = $\frac{3}{5}$

Question 2.
Fill in the blanks :

(i) $\dfrac{5}{8}$ is ....fraction.

(ii) $\dfrac{8}{5}$ is .... fraction.

(iii) $\dfrac{-15}{-15}$ is .... fraction.

(iv) The value of $\dfrac{5}{5}=$ ....

(v) The value of $\dfrac{5}{-5}=$ ....

(vi) $3\dfrac{3}{10}$ is .... fraction.

(vii) $\dfrac{2}{15}$ and $\dfrac{7}{15}$ are ....fractions.

(viii) $\dfrac{23}{12}$ and $\dfrac{23}{15}$ are .... fractions.

(ix) $\dfrac{6}{15}$ and $\dfrac{28}{70}$ are .... fractions.

(x) $\dfrac{8}{24}$ and $\dfrac{8}{32}$ are not .... fractions.

(xi) $3\dfrac{2}{13} = \dfrac{3 \times 13 + ...}{13} = ...$.

(xii) $-4\dfrac{3}{5} = ... = ...$.

Solution:
(i) Proper
(ii) Improper
(iii) Improper
(iv) 1
(v) -1
(vi) Mixed
(vii) Like
(viii) Unlike fraction
(ix) Equal fraction
(x) Like

(xi) $+ 2 = \dfrac{41}{13}$

(xii) $- \dfrac{(4 \times 5 + 3)}{5} = -\dfrac{23}{5}$

Question 3.
From the following fractions, separate :
(i) Proper fractions
(ii)Improper fractions :

$$\dfrac{2}{9}, \dfrac{4}{3}, \dfrac{7}{15}, \dfrac{11}{20}, \dfrac{20}{11}, \dfrac{18}{23} \text{ and } \dfrac{27}{35}.$$

Solution:
We know that proper fraction is a fraction whose numerator is less than its denominator and improper fraction is the fraction whose numerator is greater them its denominator :

$$\dfrac{2}{9}, \dfrac{7}{15}, \dfrac{11}{20}, \dfrac{18}{23} \text{ and } \dfrac{27}{35} \text{ are proper}$$

fractions and $\dfrac{4}{3}, \dfrac{20}{11}$ are imporper fractions.

Question 4.
Change the following mixed fractions to improper fractions :

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

(iii) $7\frac{1}{8}$　　　　　(iv) $2\frac{1}{11}$

Solution:

$$(i) \; 2\frac{1}{5} = \frac{2 \times 5 + 1}{5} = \frac{10 + 1}{5} = \frac{11}{5}$$

$$(ii) \; 3\frac{1}{4} = \frac{3 \times 4 + 1}{4} = \frac{12 + 1}{4} = \frac{13}{4}$$

$$(iii) \; 7\frac{1}{8} = \frac{7 \times 8 + 1}{8} = \frac{56 + 1}{8} = \frac{57}{8}$$

$$(iv) \; 2\frac{1}{11} = \frac{2 \times 11 + 1}{11} = \frac{22 + 1}{11} = \frac{23}{11}$$

Question 5.
Change the following improper fractions to mixed fractions :

(i) $\frac{100}{17}$　　　　　(ii) $\frac{81}{11}$

(iii) $-\frac{209}{7}$　　　　　(iv) $-\frac{113}{15}$

Solution:

$$(i) \; \frac{100}{17} = 5\frac{15}{17} \qquad (ii) \; \frac{81}{11} = 7\frac{4}{11}$$

$$(iii) \; -\frac{209}{7} = -29\frac{6}{7}$$

$$(iv) \; -\frac{113}{15} = -7\frac{8}{15}$$

Question 6.
Change the following groups of fractions to like fractions :

(i) $\frac{1}{3}, \frac{2}{5}, \frac{3}{4}, \frac{1}{6}$　(ii) $\frac{5}{6}, \frac{7}{8}, \frac{11}{12}, \frac{3}{10}$

(iii) $\frac{2}{7}, \frac{7}{8}, \frac{5}{14}, \frac{9}{16}$

Solution:

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

L.C.M. of denominators 3, 5, 4, 6 = 60

$$
\begin{array}{c|cccc}
2 & 3, & 5, & 4, & 6 \\
\hline
3 & 3, & 5, & 2, & 3 \\
\hline
& 1, & 5, & 2, & 1
\end{array}
$$

$= 2 \times 3 \times 1 \times 5 \times 2 \times 1 = 60$

Now, $\frac{1}{3} = \frac{1 \times 20}{3 \times 20} = \frac{20}{60}$;

$\frac{2}{5} = \frac{2 \times 12}{5 \times 12} = \frac{24}{60}$; $\frac{3}{4} = \frac{3 \times 15}{4 \times 15} = \frac{45}{60}$

$\frac{1}{6} = \frac{1 \times 10}{6 \times 10} = \frac{10}{60}$

$\frac{1}{3}, \frac{2}{5}, \frac{3}{4}$ and $\frac{1}{6} = \frac{20}{60}, \frac{24}{60}, \frac{45}{60}, \frac{10}{60}$

(ii) $\frac{5}{6}, \frac{7}{8}, \frac{11}{12}, \frac{3}{10}$

L.C.M. of denominators 6, 8, 12, 10 = 120

$$
\begin{array}{c|cccc}
2 & 6, & 8, & 12, & 10 \\
\hline
2 & 3, & 4, & 6, & 5 \\
\hline
3 & 3, & 2, & 3, & 5 \\
\hline
& 1, & 2, & 1, & 5
\end{array}
$$

$= 2 \times 2 \times 3 \times 2 \times 5 = 120$

Now, $\frac{5}{6} = \frac{5 \times 20}{6 \times 20} = \frac{100}{120}$;

$\frac{7}{8} = \frac{7 \times 15}{8 \times 15} = \frac{105}{120}$; $\frac{11}{12} = \frac{11 \times 10}{12 \times 10}$

$= \frac{110}{120}$; $\frac{3}{10} = \frac{3 \times 12}{10 \times 12} = \frac{36}{120}$

$\therefore \frac{5}{6}, \frac{7}{8}, \frac{11}{12}, \frac{3}{10} = \frac{100}{120}, \frac{105}{120}, \frac{110}{120}, \frac{36}{120}$

(iii) $\dfrac{2}{7}, \dfrac{7}{8}, \dfrac{5}{14}, \dfrac{9}{16}$

L.C.M. of denominators 7, 8, 14, 16 = 112

$$
\begin{array}{r|llll}
2 & 7, & 8, & 14 & 16 \\
\hline
7 & 7, & 4, & 7, & 8 \\
\hline
4 & 1, & 4, & 1, & 8 \\
\hline
 & 1, & 1, & 1, & 2
\end{array}
$$

$$= 2 \times 7 \times 4 \times 2 = 112$$

Now, $\dfrac{2}{7} = \dfrac{2 \times 16}{7 \times 16} = \dfrac{32}{112}$; $\dfrac{7}{8} = \dfrac{7 \times 14}{8 \times 14}$

$$= \dfrac{98}{112} ; \dfrac{5}{14} = \dfrac{5 \times 8}{14 \times 8} = \dfrac{40}{112} ; \dfrac{9}{16}$$

$$= \dfrac{9 \times 7}{16 \times 7} = \dfrac{63}{112}$$

$$\therefore \dfrac{2}{7}, \dfrac{7}{8}, \dfrac{5}{14}, \dfrac{9}{16}$$

$$= \dfrac{32}{112}, \dfrac{98}{112}, \dfrac{40}{112}, \dfrac{63}{112}$$

EXERCISE 14(B)

Question 1.
Reduce the given fractions to their lowest terms :

(i) $\dfrac{8}{10}$

(ii) $\dfrac{50}{75}$

(iii) $\dfrac{18}{81}$

(iv) $\dfrac{40}{120}$

(v) $\dfrac{105}{70}$

Solution:

(i) $\dfrac{8}{10} = \dfrac{8 \div 2}{10 \div 2} = \dfrac{4}{5}$

(ii) $\dfrac{50}{75} = \dfrac{50 \div 25}{75 \div 25} = \dfrac{2}{3}$

(iii) $\dfrac{18}{81} = \dfrac{18 \div 9}{81 \div 9} = \dfrac{2}{9}$

(iv) $\dfrac{40}{120} = \dfrac{40 \div 40}{120 \div 40} = \dfrac{1}{3}$

(v) $\dfrac{105}{70} = \dfrac{105 \div 35}{70 \div 35} = \dfrac{3}{2}$

Question 2.
State, whether true or false ?

(i) $\dfrac{2}{5} = \dfrac{10}{15}$ (ii) $\dfrac{35}{42} = \dfrac{5}{6}$

(iii) $\dfrac{5}{4} = \dfrac{4}{5}$ (iv) $\dfrac{7}{9} = 1\dfrac{1}{7}$

(v) $\dfrac{9}{7} = 1\dfrac{1}{7}$

Solution:

(i) $\dfrac{2}{5} = \dfrac{10}{15} = \dfrac{10 \div 5}{15 \div 5} = \dfrac{2}{3}$

$\therefore \dfrac{2}{5} \neq \dfrac{2}{3}$, **False**

(ii) $\dfrac{35}{42} = \dfrac{5}{6}$

$\dfrac{35}{42} = \dfrac{35 \div 7}{42 \div 7} = \dfrac{5}{6}$

$\therefore \dfrac{5}{6} = \dfrac{5}{6}$, **True**

(iii) $\dfrac{5}{4} = \dfrac{4}{5}$, **False**

(iv) $\dfrac{7}{9} = 1\dfrac{1}{7}$

Now, $\dfrac{7}{9} ; 1\dfrac{1}{7} = \dfrac{7 \times 1 + 1}{7} = \dfrac{8}{7}$

$\dfrac{7}{9} \neq \dfrac{8}{7}$, **False**

(v) $\dfrac{9}{7} = 1\dfrac{1}{7}$

Now, $\dfrac{9}{7} ; 1\dfrac{1}{7} = \dfrac{7 \times 1 + 1}{7} = \dfrac{8}{7}$

$\dfrac{9}{7} \neq \dfrac{8}{7}$, **False.**

Question 3.
Which fraction is greater ?

(i) $\dfrac{3}{5}$ or $\dfrac{2}{3}$ (ii) $\dfrac{5}{9}$ or $\dfrac{3}{4}$

(iii) $\dfrac{11}{14}$ or $\dfrac{26}{35}$

Solution:

(i) $\dfrac{3}{5}$ or $\dfrac{2}{3}$

L.C.M. of 5, 3 = 15

Now, $\dfrac{3}{5} = \dfrac{3 \times 3}{5 \times 3} = \dfrac{9}{15}$;

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

$\dfrac{10}{15} > \dfrac{9}{15}$ $\therefore \dfrac{2}{3} > \dfrac{3}{5}$ [as its numerator is greater]

(ii) $\dfrac{5}{9}$ or $\dfrac{3}{4}$

Converting in like fraction,

$\dfrac{5 \times 4}{9 \times 4} = \dfrac{20}{36}$; $\dfrac{3}{4} = \dfrac{3 \times 9}{4 \times 9} = \dfrac{27}{36}$

$\dfrac{3}{4} > \dfrac{5}{9}$ [as its numerator is greater]

(iii) $\dfrac{11}{14}$ or $\dfrac{26}{35}$

Converting in like fraction,

$\dfrac{11}{14} = \dfrac{11 \times 5}{14 \times 5} = \dfrac{55}{70}$; $\dfrac{26}{35} = \dfrac{26 \times 2}{35 \times 2} = \dfrac{52}{70}$

$\dfrac{11}{14} > \dfrac{26}{35}$ [as its numerator is greater]

Question 4.

Which fraction is smaller?

(i) $\dfrac{3}{8}$ or $\dfrac{4}{5}$ (ii) $\dfrac{8}{15}$ or $\dfrac{4}{7}$

(iii) $\dfrac{7}{26}$ or $\dfrac{10}{39}$

Solution:

(i) $\dfrac{3}{8}$ or $\dfrac{4}{5}$

Converting in like fraction

$\dfrac{3}{8} = \dfrac{3 \times 5}{8 \times 5} = \dfrac{15}{40}$; $\dfrac{4}{5} = \dfrac{4 \times 8}{5 \times 8} = \dfrac{32}{40}$

$\dfrac{3}{8} < \dfrac{4}{5}$ [as its numerator is smaller]

(ii) $\dfrac{8}{15}$ or $\dfrac{4}{7}$

Converting into like fraction

$\dfrac{8}{15} = \dfrac{8 \times 7}{15 \times 7} = \dfrac{56}{105}$; $\dfrac{4}{7} = \dfrac{4 \times 15}{7 \times 15} = \dfrac{60}{105}$

$\dfrac{8}{15} < \dfrac{4}{7}$ [as its numerator is smaller]

(iii) $\dfrac{7}{26}$ or $\dfrac{10}{39}$

Converting the like fraction

$\dfrac{7}{26} = \dfrac{7 \times 3}{26 \times 3} = \dfrac{21}{78}$; $\dfrac{10}{39} = \dfrac{10 \times 2}{39 \times 2} = \dfrac{20}{78}$

$\dfrac{10}{39} < \dfrac{7}{26}$ [as its numerator is smaller]

Question 5.
Arrange the given fractions in descending order of magnitude :

(i) $\dfrac{5}{16}, \dfrac{13}{24}, \dfrac{7}{8}$ (ii) $\dfrac{4}{5}, \dfrac{7}{15}, \dfrac{11}{20}, \dfrac{3}{4}$

(iii) $\dfrac{5}{7}, \dfrac{3}{8}, \dfrac{9}{11}$

Solution:

(i) $\dfrac{5}{16}, \dfrac{13}{24}, \dfrac{7}{8}$

2	16, 24, 8
2	8, 12, 4
2	4, 6, 2
2	2, 3, 1
3	1, 3, 1
	1, 1, 1

∴L.C.M. of 16, 24, 8 = 2 × 2 × 2 × 2 × 3 = 48

L.C.M. of denominator 16, 24, 8 = 48

Converting into like fractions

$$\frac{5}{16} = \frac{5 \times 3}{16 \times 3} = \frac{15}{48}; \quad \frac{13}{24} = \frac{13 \times 2}{24 \times 2} = \frac{26}{48};$$

$$\frac{7}{8} = \frac{7 \times 6}{8 \times 6} = \frac{42}{48}$$

Now, arranging in descending order

$$\frac{7}{8}, \frac{13}{24}, \frac{5}{16}$$

(ii) $\frac{4}{5}, \frac{7}{15}, \frac{11}{20}, \frac{3}{4}$

L.C.M. of denominator 5, 15, 20, 4 = 60

Converting into like fractions,

$$\frac{4}{5} = \frac{4 \times 12}{5 \times 12} = \frac{48}{60}; \quad \frac{7}{15} = \frac{7 \times 4}{15 \times 4} = \frac{28}{60};$$

$$\frac{11}{20} = \frac{11 \times 3}{20 \times 3} = \frac{33}{60}; \quad \frac{3}{4} = \frac{3 \times 15}{4 \times 15} = \frac{45}{60}$$

Now, arranging in descending order,

$$\frac{4}{5}, \frac{3}{4}, \frac{11}{20}, \frac{7}{15}$$

(iii) $\frac{5}{7}, \frac{3}{8}, \frac{9}{11}$

L.C.M. of numerator 5, 3, 9 = 45

$$
\begin{array}{r|ccc}
3 & 5, & 3, & 9 \\
\hline
5 & 5, & 1, & 3 \\
\hline
3 & 1, & 1, & 3 \\
\hline
 & 1, & 1, & 1
\end{array}
$$

$$= 3 \times 5 \times 3 = 45$$

$$\therefore \frac{5}{7} = \frac{5 \times 9}{7 \times 9} = \frac{45}{63}; \quad \frac{3}{8} = \frac{3 \times 15}{8 \times 15} = \frac{45}{120}$$

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

We know that the numerator being same, the fraction having the smallest denominator is the biggest fraction.

$$\therefore \frac{45}{55}, \frac{45}{63}, \frac{45}{120}$$

i.e. $\frac{9}{11}, \frac{5}{7}, \frac{3}{8}$

Question 6.
Arrange the given fractions in ascending order of magnitude :

(i) $\dfrac{9}{16}, \dfrac{7}{12}, \dfrac{1}{4}$ (ii) $\dfrac{5}{6}, \dfrac{2}{7}, \dfrac{8}{9}, \dfrac{1}{3}$

(iii) $\dfrac{2}{3}, \dfrac{5}{9}, \dfrac{5}{6}, \dfrac{3}{8}$

Solution:

(i) $\dfrac{9}{16}, \dfrac{7}{12}, \dfrac{1}{4}$

L.C.M. of the denominator 16, 12, 4
= 48

$$
\begin{array}{r|ccc}
4 & 16, & 12, & 4 \\
\hline
4 & 4, & 3, & 1 \\
\hline
3 & 1, & 3, & 1 \\
\hline
  & 1, & 1, & 1 \\
\end{array}
$$

= 4 × 4 × 3 = 48

$\therefore \dfrac{9}{16} = \dfrac{9 \times 3}{16 \times 3} = \dfrac{27}{48} ; \dfrac{7}{12} = \dfrac{7 \times 4}{12 \times 4} = \dfrac{28}{48}$

$\dfrac{1}{4} = \dfrac{1 \times 12}{4 \times 12} = \dfrac{12}{48}$

Arranging in ascending order,

$\dfrac{12}{48}, \dfrac{27}{48}, \dfrac{28}{48}$

i.e. $\dfrac{1}{4}, \dfrac{9}{16}, \dfrac{7}{12}$

(ii) $\dfrac{5}{6}, \dfrac{2}{7}, \dfrac{8}{9}, \dfrac{1}{3}$

L.C.M. of the denominator 6, 7, 9, 3
= 126

$$
\begin{array}{r|llll}
3 & 6, & 7, & 9, & 3 \\
\hline
& 2, & 7, & 3, & 1
\end{array}
$$

$= 3 \times 2 \times 7 \times 3 = 126$

$\therefore \dfrac{5}{6} = \dfrac{5 \times 21}{6 \times 21} = \dfrac{105}{126}$; $\dfrac{2}{7} = \dfrac{2 \times 18}{7 \times 18} = \dfrac{36}{126}$

$\dfrac{8}{9} = \dfrac{8 \times 14}{9 \times 14} = \dfrac{112}{126}$;

$\dfrac{1}{3} = \dfrac{1 \times 42}{3 \times 42} = \dfrac{42}{126}$

Arranging in ascending order,

$\dfrac{36}{126}, \dfrac{42}{126}, \dfrac{105}{126}, \dfrac{112}{126}$

i.e. $\dfrac{2}{7}, \dfrac{1}{3}, \dfrac{5}{6}, \dfrac{8}{9}$

(iii) $\dfrac{2}{3}, \dfrac{5}{9}, \dfrac{5}{6}, \dfrac{3}{8}$

L.C.M. of the denominator 3, 9, 6, 8
= 72

$$
\begin{array}{r|llll}
2 & 3, & 9, & 6, & 8 \\
\hline
3 & 3, & 9, & 3, & 4 \\
\hline
& 1, & 3, & 1, & 4
\end{array}
$$

$= 2 \times 3 \times 3 \times 4 = 72$

$\therefore \dfrac{2}{3} = \dfrac{2 \times 24}{3 \times 24} = \dfrac{48}{72}$; $\dfrac{5}{9} = \dfrac{5 \times 8}{9 \times 8} = \dfrac{40}{72}$

$\dfrac{5}{6} = \dfrac{5 \times 12}{6 \times 12} = \dfrac{60}{72}$; $\dfrac{3}{8} = \dfrac{3 \times 9}{8 \times 9} = \dfrac{27}{72}$

Arranging in ascending order,

$\dfrac{27}{72}, \dfrac{40}{72}, \dfrac{48}{72}, \dfrac{60}{72}$

i.e. $\dfrac{3}{8}, \dfrac{5}{9}, \dfrac{2}{3}, \dfrac{5}{6}$

Question 7.
I bought one dozen bananas and ate five of them. What fraction of the total number of bananas was left ?
Solution:
Number of bananas bought = 1

Dozen = 12
Number of bananas eaten by me = 5
Number of bananas left = 12 – 5 = 7

Fraction = $\frac{7}{12}$

Question 8.

Insert the symbol '=' or '>' or '<' between each of the pairs of fractions, given below :

(i) $\frac{6}{11}$ ... $\frac{5}{9}$ (ii) $\frac{3}{7}$ ... $\frac{9}{13}$

(iii) $\frac{56}{64}$ ... $\frac{7}{8}$ (iv) $\frac{5}{12}$ ... $\frac{8}{33}$

Solution:

(i) $\frac{6}{11}, \frac{5}{9}$

L.C.M. of 11, 9 = 99

$\therefore \frac{6}{11} = \frac{6 \times 9}{11 \times 9} = \frac{54}{99}$

and $\frac{5}{9} = \frac{5 \times 11}{9 \times 11} = \frac{55}{99}$

It is clear that $\frac{54}{99} < \frac{55}{99}$

$\Rightarrow \frac{6}{11} < \frac{5}{9}$

(ii) $\frac{3}{7}, \frac{9}{13}$

L.C.M. of 7, 13 = 91

$\therefore \frac{3}{7} = \frac{3 \times 13}{7 \times 13} = \frac{39}{91}$

and $\frac{9}{13} = \frac{9 \times 7}{13 \times 7} = \frac{63}{91}$

It is clear that $\frac{39}{91} < \frac{63}{91}$

$\Rightarrow \frac{3}{7} < \frac{9}{13}$

(iii) $\dfrac{56}{64}, \dfrac{7}{8}$

L.C.M. of 64, 8 = 64

$\therefore \dfrac{56 \times 1}{64 \times 1} = \dfrac{56}{64}$

$\dfrac{7}{8} = \dfrac{7 \times 8}{8 \times 8} = \dfrac{56}{64}$

It is clear that

$\dfrac{56}{64} = \dfrac{56}{64} \Rightarrow \dfrac{56}{64} = \dfrac{7}{8}$

(iv) $\dfrac{5}{12}, \dfrac{8}{33}$

L.C.M. of 12, 33 = 132

$\dfrac{5}{12} = \dfrac{5 \times 11}{12 \times 11} = \dfrac{55}{132}$

and $\dfrac{8}{33} = \dfrac{8 \times 4}{33 \times 4} = \dfrac{32}{132}$

It is clear that

$\dfrac{55}{132} > \dfrac{32}{132} \Rightarrow \dfrac{5}{12} > \dfrac{8}{33}$

Question 9.
Out of 50 identical articles, 36 are broken. Find the fraction of :
(i) The total number of articles and the articles broken.
(ii) The remaining articles and total number of articles.
Solution:
Total number of articles = 50
Number of articles broken = 36
Remaining articles = 50 – 36 = 14

Now (i) the fraction of the total number of articles and articles broken = $\dfrac{50}{36}$

$= \dfrac{50 \div 2}{36 \div 2} = \dfrac{25}{18}$

(ii) The fraction between the remaining articles
and total number of articles

$= \dfrac{14}{50} = \dfrac{14 \div 2}{50 \div 2} = \dfrac{7}{25}$

EXERCISE 14(C)

Question 1.
Add the following fractions :

(i) $1\dfrac{3}{4}$ and $\dfrac{3}{8}$

(ii) $\dfrac{2}{5}, 2\dfrac{3}{15}$ and $\dfrac{7}{10}$

(iii) $1\dfrac{7}{8}, 1\dfrac{1}{2}$ and $1\dfrac{3}{4}$

(iv) $3\dfrac{3}{4}, 2\dfrac{1}{6}$ and $1\dfrac{5}{8}$

(v) $2\dfrac{8}{9}, \dfrac{11}{18}$ and $3\dfrac{5}{6}$

(vi) $3\dfrac{1}{8}, 5\dfrac{5}{12}$ and $\dfrac{5}{16}$

Solution:

(i) $1\dfrac{3}{4}$ and $\dfrac{3}{8}$

$= \dfrac{7}{4} + \dfrac{3}{8}$

$= \dfrac{7 \times 2}{4 \times 2} + \dfrac{3}{8}$ \qquad (LCM of 4, 8 = 8)

$= \dfrac{14}{8} + \dfrac{3}{8} = \dfrac{14+3}{8} = \dfrac{17}{8} = 2\dfrac{1}{8}$

(ii) $\dfrac{2}{5}, 2\dfrac{3}{15}$ and $\dfrac{7}{10}$

$= \dfrac{2}{5} + \dfrac{33}{15} + \dfrac{7}{10}$

$= \dfrac{2 \times 6}{5 \times 6} + \dfrac{33 \times 2}{15 \times 2} + \dfrac{7 \times 3}{10 \times 3}$

\qquad (LCM of 5, 15 and 10 = 30)

$= \dfrac{12}{30} + \dfrac{66}{30} + \dfrac{21}{30}$

$= \dfrac{12+66+21}{30} = \dfrac{99}{30} = \dfrac{99 \div 3}{30 \div 3}$

$= \dfrac{33}{10} = 3\dfrac{3}{10}$

(iii) $1\dfrac{7}{8}+1\dfrac{1}{2}+1\dfrac{3}{4}$

$$= \dfrac{1\times 8+7}{8}+\dfrac{1\times 2+1}{2}+\dfrac{1\times 4+3}{4}$$

$$= \dfrac{15}{8}+\dfrac{3}{2}+\dfrac{7}{4}=\dfrac{15\times 1}{8\times 1}+\dfrac{3\times 4}{2\times 4}+\dfrac{7\times 2}{4\times 2}$$

$$= \dfrac{15}{8}+\dfrac{12}{8}+\dfrac{14}{8}=\dfrac{15+12+14}{8}$$

(L.C.M. 8, 2 and 4 is 8)

$$= \dfrac{41}{8}=5\dfrac{1}{8}$$

(iv) $3\dfrac{3}{4}+2\dfrac{1}{6}+1\dfrac{5}{8}$

$$= \dfrac{3\times 4+3}{4}+\dfrac{2\times 6+1}{6}+\dfrac{1\times 8+5}{8}$$

$$= \dfrac{15}{4}+\dfrac{13}{6}+\dfrac{13}{8} \quad \text{(L.C.M. 4, 6 and 8 is 24)}$$

$$= \dfrac{15\times 6}{4\times 6}+\dfrac{13\times 4}{6\times 4}+\dfrac{13\times 3}{8\times 3}$$

$$= \dfrac{90}{24}+\dfrac{52}{24}+\dfrac{39}{24}=\dfrac{181}{24}=7\dfrac{13}{24}$$

(v) $2\dfrac{8}{9}, \dfrac{11}{18}$ and $3\dfrac{5}{6}$

$$= \dfrac{26}{9}+\dfrac{11}{18}+\dfrac{23}{6}=\dfrac{26\times 2}{9\times 2}+\dfrac{11}{18}+\dfrac{23\times 3}{6\times 3}$$

(LCM of 9, 18 and 6 = 18)

$$= \dfrac{52}{18}+\dfrac{11}{18}+\dfrac{69}{18}$$

$$= \dfrac{52+11+69}{18}=\dfrac{132}{18}=\dfrac{132\div 6}{18\div 6}$$

$$= \dfrac{22}{3}=7\dfrac{1}{3}$$

(vi) $3\dfrac{1}{8} + 5\dfrac{5}{12} + \dfrac{5}{16}$

$$= \dfrac{3 \times 8 + 1}{8} + \dfrac{5 \times 12 + 5}{12} + \dfrac{5}{16}$$

$$= \dfrac{25}{8} + \dfrac{65}{12} + \dfrac{5}{16}$$

(L.C.M. 8, 12 and 16 is 48)

$$= \dfrac{25 \times 6}{8 \times 6} + \dfrac{65 \times 4}{12 \times 4} + \dfrac{5 \times 3}{16 \times 3}$$

$$= \dfrac{150}{48} + \dfrac{260}{48} + \dfrac{15}{48}$$

$$= \dfrac{150 + 260 + 15}{48}$$

$$= \dfrac{425}{48} = 8\dfrac{41}{48}$$

Question 2.
Simplify:

(i) $1\dfrac{11}{12} - \dfrac{13}{16}$

(ii) $2\dfrac{3}{4} - 1\dfrac{5}{6}$

(iii) $2\dfrac{5}{7} + \dfrac{3}{14} - \dfrac{13}{21}$

(iv) $3\dfrac{5}{6} - \dfrac{1}{6} - 1\dfrac{1}{12}$

(v) $6 + \dfrac{3}{10} - 1\dfrac{8}{15}$

(vi) $1\dfrac{3}{4} + 2\dfrac{5}{7} - 1\dfrac{3}{14}$

(vii) $4 + 3\dfrac{1}{8} - 3\dfrac{1}{6}$

(viii) $6 - 3\dfrac{1}{2} - 2\dfrac{1}{5}$

(ix) $1\dfrac{5}{8} - 2\dfrac{1}{6} + 3\dfrac{3}{4}$

(x) $3\dfrac{1}{2} + 1\dfrac{2}{3} - 2\dfrac{1}{4}$

(xi) $4\dfrac{3}{5} - 2\dfrac{7}{9} - 1\dfrac{2}{15} - \dfrac{2}{45}$

Solution:

(i) $1\frac{11}{12} - \frac{13}{16} = \frac{23}{12} - \frac{13}{16}$

$= \frac{23 \times 4}{12 \times 4} - \frac{13 \times 3}{16 \times 3}$ (LCM of 12, 16 = 48)

$= \frac{92}{48} - \frac{39}{48} = \frac{92-39}{48}$

$= \frac{53}{48} = 1\frac{5}{48}$

(ii) $2\frac{3}{4} - 1\frac{5}{6} = \frac{11}{4} - \frac{11}{6} = \frac{11 \times 6}{4 \times 6} - \frac{11 \times 4}{6 \times 4}$

$= \frac{66}{24} - \frac{44}{24}$

$= \frac{66-44}{24} = \frac{22}{24} = \frac{11}{12}$

(iii) $2\frac{5}{7} + \frac{3}{14} - \frac{13}{21}$

$= \frac{19}{7} + \frac{3}{14} - \frac{13}{21}$

$= \frac{19 \times 6}{7 \times 6} + \frac{3 \times 3}{14 \times 3} - \frac{13 \times 2}{21 \times 2}$

(LCM of 7, 14, 21 = 42)

$= \frac{114}{42} + \frac{9}{42} - \frac{26}{42}$

$= \frac{114+9-26}{42} = \frac{123-26}{42}$

$= \frac{97}{42} = 2\frac{13}{42}$

(iv) $3\dfrac{5}{6} - \dfrac{1}{6} - 1\dfrac{1}{12} = \dfrac{23}{6} - \dfrac{1}{6} - \dfrac{13}{12}$

$\qquad = \dfrac{23 \times 2}{6 \times 2} - \dfrac{1 \times 2}{6 \times 2} - \dfrac{13}{12}$

$\qquad = \dfrac{46}{12} - \dfrac{2}{12} - \dfrac{13}{12} = \dfrac{46 - 2 - 13}{12}$

$\qquad = \dfrac{46 - 15}{12} = \dfrac{31}{12} = 2\dfrac{7}{12}$

(v) $6 + \dfrac{3}{10} - 1\dfrac{8}{15}$

$= \dfrac{6}{1} + \dfrac{3}{10} - \dfrac{23}{15}$

$= \dfrac{6 \times 30}{1 \times 30} + \dfrac{3 \times 3}{10 \times 3} - \dfrac{23 \times 2}{15 \times 2}$

$\qquad\qquad$ (LCM of 1, 10, 15 = 30)

$= \dfrac{180}{30} + \dfrac{9}{30} - \dfrac{46}{30}$

$= \dfrac{180 + 9 - 46}{30} = \dfrac{189 - 46}{30}$

$$= \frac{143}{30} = 4\frac{23}{30}$$

(vi) $1\frac{3}{4} + 2\frac{5}{7} - 1\frac{3}{14} = \frac{7}{4} + \frac{19}{7} - \frac{17}{14}$

$$= \frac{7 \times 7}{4 \times 7} + \frac{19 \times 4}{7 \times 4} - \frac{17 \times 2}{14 \times 2}$$

$$= \frac{49}{28} + \frac{76}{28} - \frac{34}{28} = \frac{49 + 76 - 34}{28} = \frac{91}{28}$$

$$= 3\frac{7}{28} = 3\frac{1}{4}$$

(vii) $4 + 3\frac{1}{8} - 3\frac{1}{6}$

$$= \frac{4}{1} + \frac{25}{8} - \frac{19}{6}$$

$$= \frac{4 \times 24}{1 \times 24} + \frac{25 \times 3}{8 \times 3} - \frac{19 \times 4}{6 \times 4}$$

(LCM of 8, 6 = 24)

$$= \frac{96}{24} + \frac{75}{24} - \frac{76}{24}$$

$$= \frac{96 + 75 - 76}{24} = \frac{95}{24} = 3\frac{23}{24}$$

(viii) $6 - 3\frac{1}{2} - 2\frac{1}{5}$

$$= \frac{6}{1} - \frac{7}{2} - \frac{11}{5}$$

$$= \frac{6 \times 10}{1 \times 10} - \frac{7 \times 5}{2 \times 5} - \frac{11 \times 2}{5 \times 2}$$

$$(\text{LCM of } 2, 5 = 10)$$

$$= \frac{60}{10} - \frac{35}{10} - \frac{22}{10}$$

$$= \frac{60 - 35 - 22}{10} = \frac{60 - 57}{10} = \frac{3}{10}$$

(ix) $1\frac{5}{8} - 2\frac{1}{6} + 3\frac{3}{4} = \frac{13}{8} - \frac{13}{6} + \frac{15}{4}$

$$= \frac{13 \times 3}{8 \times 3} - \frac{13 \times 4}{6 \times 4} + \frac{15 \times 6}{4 \times 6} = \frac{39}{24} - \frac{52}{24} + \frac{90}{24}$$

$$= \frac{39 - 52 + 90}{24} = \frac{129 - 52}{24} = \frac{77}{24} = 3\frac{5}{24}$$

(x) $\quad 3\frac{1}{2} + 1\frac{2}{3} - 2\frac{1}{4} = \frac{7}{2} + \frac{5}{3} - \frac{9}{4}$

$$= \frac{7 \times 6}{2 \times 6} + \frac{5 \times 4}{3 \times 4} - \frac{9 \times 3}{4 \times 3}$$

$$= \frac{42}{12} + \frac{20}{12} - \frac{27}{12}$$

$$= \frac{42 + 20 - 27}{12}$$

$$= \frac{62 - 27}{12} = \frac{35}{12} = 2\frac{11}{12}$$

(xi) $\quad 4\frac{3}{5} - 2\frac{7}{9} - 1\frac{2}{15} - \frac{2}{45}$

$$= \frac{23}{5} - \frac{25}{9} - \frac{17}{15} - \frac{2}{45}$$

$$= \frac{23 \times 9}{5 \times 9} - \frac{25 \times 5}{9 \times 5} - \frac{17 \times 3}{15 \times 3} - \frac{2 \times 1}{45 \times 1}$$

$$= \frac{207}{45} - \frac{125}{45} - \frac{51}{45} - \frac{2}{45}$$

$$= \frac{207 - 125 - 51 - 2}{45}$$

$$= \frac{207 - 178}{45} = \frac{29}{45}$$

EXERCISE 14(D)

Point to Remember :
BODMAS :- While simplifying an expressions we can involve six operation in following orders.
B Stands for **"BRACKET"**
O Stands for **"OF"**
D Stands for **"DIVISION"**
M Stands for **"MULTIPLICATION"**
A Stands for **"ADDITION"**
S Stands for **"SUBTRACTION"**

Question 1.

(i) $\dfrac{3}{7} \times \dfrac{2}{5}$

(ii) $\dfrac{4}{9} \times \dfrac{3}{5}$

(iii) $\dfrac{5}{12} \times 8$

(iv) $\dfrac{7}{6}$ of $\dfrac{3}{14}$

(v) $3\dfrac{3}{8} \times 3\dfrac{6}{7}$

(vi) $\dfrac{1}{2}$ of $\dfrac{1}{3} \times \dfrac{3}{4}$ (vii) $\dfrac{3}{7} \times \dfrac{5}{9} \times 4\dfrac{1}{5}$

(viii) $1\dfrac{1}{3} \times 1\dfrac{2}{7}$ of $1\dfrac{1}{4}$

Solution:

(i) $\dfrac{3}{7} \times \dfrac{2}{5} = \dfrac{3 \times 2}{7 \times 5} = \dfrac{6}{35}$

(ii) $\dfrac{4}{9} \times \dfrac{3}{5} = \dfrac{4 \times 3}{9 \times 5} = \dfrac{4 \times 1}{3 \times 5} = \dfrac{4}{15}$

(iii) $\dfrac{5}{12} \times 8 = \dfrac{5}{12} \times \dfrac{8}{1} = \dfrac{5 \times 2}{3 \times 1} = \dfrac{10}{3} = 3\dfrac{1}{3}$

(iv) $\dfrac{7}{6}$ of $\dfrac{3}{14} = \dfrac{7}{6} \times \dfrac{3}{14} = \dfrac{3 \times 1}{2 \times 1} = \dfrac{1}{4}$

(v) $3\dfrac{3}{8} \times 3\dfrac{6}{7} = \dfrac{27}{8} \times \dfrac{27}{7}$

$= \dfrac{27 \times 27}{8 \times 7} = \dfrac{729}{56} = 13\dfrac{1}{56}$

(vi) $\dfrac{1}{2}$ of $\dfrac{1}{3} \times \dfrac{3}{4} = \dfrac{1}{2} \times \dfrac{1}{3} \times \dfrac{3}{4} = \dfrac{1}{6} \times \dfrac{3}{4} = \dfrac{1 \times 1}{2 \times 4} = \dfrac{1}{8}$

$\left[\begin{array}{l} \text{Using} \\ \text{Bodmas} \end{array} \dfrac{1}{2} \text{ of } \dfrac{1}{3} = \dfrac{1}{2} \times \dfrac{1}{3} = \dfrac{1}{6} \right]$

(vii) $\dfrac{3}{7} \times \dfrac{5}{9} \times 4\dfrac{1}{5} = \dfrac{3}{7} \times \dfrac{5}{9} \times \dfrac{21}{5}$

$$= \frac{3 \times 5 \times 21}{7 \times 9 \times 5} = 1$$

(viii) $1\frac{1}{3} \times 1\frac{2}{7}$ of $1\frac{1}{4} = \frac{4}{3} \times \frac{9}{7} \times \frac{5}{4}$

$$= \frac{4 \times 9 \times 5}{3 \times 7 \times 4} = \frac{15}{7} = 2\frac{1}{7}$$

Question 2.
Simplify :

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

(ii) $4\frac{1}{2} \div \frac{4}{9}$

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

(iv) $\frac{4}{9} \div \frac{4}{9}$

(v) $2\frac{1}{3} \div 1\frac{3}{4}$

(vi) $2\frac{2}{3} \times 3\frac{1}{2} \div 2\frac{4}{9}$

Solution:

(i)
$$\frac{2}{3} \div 1\frac{1}{5} = \frac{2}{3} \div \frac{6}{5} = \frac{2}{3} \times \frac{5}{6} = \frac{2 \times 5}{3 \times 6} = \frac{5}{9}$$

(ii) $4\frac{1}{2} \div \frac{4}{9} = \frac{9}{2} \div \frac{4}{9} = \frac{9}{2} \times \frac{9}{4} = \frac{9 \times 9}{2 \times 4}$

$$= \frac{81}{8} = 10\frac{1}{8}$$

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

(iv) $\frac{4}{9} \div \frac{4}{9} = \frac{4}{9} \times \frac{9}{4} = \frac{4 \times 9}{9 \times 4} = 1$

(v) $2\frac{1}{3} \div 1\frac{3}{4} = \frac{7}{3} \div \frac{7}{4} = \frac{7}{3} \times \frac{4}{7}$

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

(vi) $2\frac{2}{3} \times 3\frac{1}{2} \div 2\frac{4}{9} = \frac{8}{3} \times \frac{7}{2} \div \frac{22}{9}$

$$= \frac{8}{3} \times \frac{7}{2} \times \frac{9}{22} = \frac{2 \times 7 \times 3}{11} = \frac{42}{11} = 3\frac{9}{11}$$

Question 3.
Simplify:

(i) $\dfrac{1}{4}$ of $2\dfrac{2}{7} \div \dfrac{3}{5}$

(ii) $1\dfrac{1}{4} \times \dfrac{1}{2} \div 1\dfrac{1}{3}$

(iii) $6\dfrac{1}{7} \times 0 \times 5\dfrac{3}{8}$

(iv) $\dfrac{3}{4} \times 1\dfrac{1}{3} \div \dfrac{3}{7}$ of $2\dfrac{5}{8}$

(v) $2\dfrac{1}{4} \div \dfrac{2}{7}$ of $1\dfrac{1}{3} \times \dfrac{2}{3}$

(vi) $\left(\dfrac{3}{7} \div \dfrac{1}{2}\right)$ of $1\dfrac{1}{7}$

(vii) $\left(1\dfrac{7}{8} \div 1\dfrac{1}{2}\right)$ of $\left(8\dfrac{1}{3} \div 1\dfrac{1}{2}\right)$

(viii) $\dfrac{1}{3}$ of $60 \div 60$.

Solution:

(i) $\dfrac{1}{4}$ of $2\dfrac{2}{7} \div \dfrac{3}{5}$

$$= \dfrac{1}{4} \times \dfrac{16}{7} \div \dfrac{3}{5} = \dfrac{4}{7} \times \dfrac{5}{3} = \dfrac{20}{21}$$

(ii) $1\dfrac{1}{4} \times \dfrac{1}{2} \div 1\dfrac{1}{3} = \dfrac{5}{4} \times \dfrac{1}{2} \div \dfrac{4}{3}$

$$= \dfrac{5}{8} \times \dfrac{3}{4} = \dfrac{15}{32}$$

(iii) $6\dfrac{1}{7} \times 0 \times 5\dfrac{3}{8} = \dfrac{43}{7} \times \dfrac{0}{0} \times \dfrac{43}{8}$

$$= \dfrac{43 \times 0 \times 43}{7 \times 0 \times 8} = 0$$

(iv) $\dfrac{3}{4} \times 1\dfrac{1}{3} \div \dfrac{3}{7}$ of $2\dfrac{5}{8} = \dfrac{3}{4} \times \dfrac{4}{3} \div \dfrac{9}{8}$

$$\left[\dfrac{3}{7} \text{ of } 2\dfrac{5}{8} = \dfrac{3}{7} \times \dfrac{21}{8} = \dfrac{9}{8}\right]$$

$$= \dfrac{3}{4} \times \dfrac{4}{3} \times \dfrac{8}{9} = \dfrac{8}{9}$$

(v) $2\dfrac{1}{4} \div \dfrac{2}{7}$ of $1\dfrac{1}{3} \times \dfrac{2}{3}$

$$\left[\frac{2}{7}\text{ of }1\frac{1}{3}=\frac{2}{7}\times\frac{4}{3}=\frac{8}{21}\right]$$

$$=\frac{9}{4}\div\frac{8}{21}\times\frac{2}{3}$$

$$=\frac{9}{4}\times\frac{21}{8}\times\frac{2}{3}=\frac{63}{16}=3\frac{15}{16}$$

(vi) $\left(\frac{3}{7}\div\frac{1}{2}\right)$ of $1\frac{1}{7}=\frac{3}{7}\times\frac{2}{1}$ of $\frac{8}{7}$

$$\left[\frac{2}{1}\text{of }\frac{8}{7}=\frac{2\times8}{7\times1}=\frac{16}{7}\right]$$

$$=\frac{3}{7}\times\frac{16}{7}=\frac{48}{49}$$

(vii) $\left(1\frac{7}{8}\div1\frac{1}{2}\right)$ of $\left(8\frac{1}{3}\div1\frac{1}{2}\right)$

$$=\left(\frac{15}{8}\div\frac{3}{2}\right)\text{ of }\left(\frac{25}{3}\div\frac{3}{2}\right)$$

$$=\frac{15}{8}\times\frac{2}{3}\text{ of }\frac{25}{3}\times\frac{2}{3}$$

$$=\frac{5}{4}\text{ of }\frac{50}{9}=\frac{5}{4}\times\frac{50}{9}=\frac{125}{18}=6\frac{17}{18}$$

(viii) $\frac{1}{3}$ of $60\div60=\frac{1}{3}\times\frac{60}{1}\div\frac{60}{1}$

$$=20\times\frac{1}{60}=\frac{20}{60}=\frac{1}{3}$$

Question 4.
Simplify :

(i) $5 - \left(\dfrac{8}{11} - 3\dfrac{3}{11} \right)$

(ii) $\dfrac{1}{2} \div \left(\dfrac{7}{8} - \dfrac{3}{5} \right)$

(iii) $2\dfrac{1}{3} \div \left(5\dfrac{1}{2} + 3\dfrac{3}{4} \right)$

(iv) $\left(3\dfrac{7}{8} - 3\dfrac{3}{5} \right) \div \dfrac{1}{2}$

(v) $\dfrac{4}{7} \div \left(\dfrac{1}{3} \times 2\dfrac{4}{5} \right)$

(vi) $\dfrac{3}{4} \div \left(\dfrac{1}{6} \div \dfrac{1}{2} \right)$

(vii) $\left(\dfrac{1}{4} - \dfrac{1}{6} \right)$ of $\left(\dfrac{2}{3} - \dfrac{5}{12} \right) \times \left(\dfrac{5}{8} - \dfrac{7}{12} \right)$

Solution:

(i) $5 - \left(\dfrac{8}{11} - 3\dfrac{3}{11} \right) = 5 - \left(\dfrac{8}{11} - \dfrac{36}{11} \right)$

$= 5 - \dfrac{8}{11} + \dfrac{36}{11} = \dfrac{55 - 8 + 36}{11}$

$= \dfrac{55 + 36 - 8}{11} = \dfrac{83}{11} = 7\dfrac{6}{11}$

(ii) $\dfrac{1}{2} \div \left(\dfrac{7}{8} - \dfrac{3}{5} \right) = \dfrac{1}{2} \div \left(\dfrac{5 \times 7 - 8 \times 3}{40} \right)$

$= \dfrac{1}{2} \div \left(\dfrac{35 - 24}{40} \right) = \dfrac{1}{2} \div \left(\dfrac{11}{40} \right)$

$= \dfrac{1}{2} \times \dfrac{40}{11} = \dfrac{20}{11} = 1\dfrac{9}{11}$

(iii) $\quad 2\dfrac{1}{3} \div \left(5\dfrac{1}{2} + 3\dfrac{3}{4}\right) = \dfrac{7}{3} \div \left(\dfrac{11}{2} + \dfrac{15}{4}\right)$

$$= \dfrac{7}{3} \div \left(\dfrac{2 \times 11 + 1 \times 15}{4}\right)$$

$$= \dfrac{7}{3} \div \left(\dfrac{22 + 15}{4}\right) = \dfrac{7}{3} \div \left(\dfrac{37}{4}\right)$$

$$= \dfrac{7}{3} \times \dfrac{4}{37} = \dfrac{\mathbf{28}}{\mathbf{111}}$$

(iv) $\quad \left(3\dfrac{7}{8} - 3\dfrac{3}{5}\right) \div \dfrac{1}{2}$

$$= \left(\dfrac{31}{8} - \dfrac{18}{5}\right) \div \dfrac{1}{2}$$

$$= \left(\dfrac{31 \times 5}{8 \times 5} - \dfrac{18 \times 8}{5 \times 8}\right) \div \dfrac{1}{2}$$

$$= \left(\dfrac{155}{40} - \dfrac{144}{40}\right) \div \dfrac{1}{2}$$

$$= \dfrac{11}{40} \div \dfrac{1}{2} = \dfrac{11}{40} \times \dfrac{2}{1} = \dfrac{11}{20}$$

(v) $\quad \dfrac{4}{7} \div \left(\dfrac{1}{3} \times 2\dfrac{4}{5}\right)$

$$= \dfrac{4}{7} \div \left(\dfrac{1}{3} \times \dfrac{14}{5}\right) = \dfrac{4}{7} \div \left(\dfrac{14}{15}\right)$$

$$= \dfrac{4}{7} \times \dfrac{15}{14} = \dfrac{60}{98} = \dfrac{\mathbf{30}}{\mathbf{49}}$$

(vi) $\quad \dfrac{3}{4} \div \left(\dfrac{1}{6} \div \dfrac{1}{2}\right)$

$$= \dfrac{3}{4} \div \left(\dfrac{1}{6} \times \dfrac{2}{1}\right) = \dfrac{3}{4} \div \left(\dfrac{1}{3}\right)$$

$$= \dfrac{3}{4} \times \dfrac{3}{1} = \dfrac{9}{4} = \mathbf{2\dfrac{1}{4}}$$

(vii) $\quad \left(\dfrac{1}{4} - \dfrac{1}{6}\right) \text{ of } \left(\dfrac{2}{3} - \dfrac{5}{12}\right) \times \left(\dfrac{5}{8} - \dfrac{7}{12}\right)$

$$= \left(\dfrac{3-2}{12}\right) \text{ of } \left(\dfrac{8-5}{12}\right) \times \left(\dfrac{15-14}{24}\right)$$

$$= \left(\dfrac{1}{12}\right) \text{ of } \left(\dfrac{3}{12}\right) \times \left(\dfrac{1}{24}\right)$$

$$= \dfrac{1}{12} \text{ of } \dfrac{3}{12} \times \dfrac{1}{24}$$

$$= \dfrac{1}{12} \times \dfrac{1}{96} = \dfrac{\mathbf{1}}{\mathbf{1152}}$$

Question 5.
Simplify :

(i) $\left(\dfrac{1}{2}+\dfrac{1}{3}\right)\div\left(\dfrac{1}{4}-\dfrac{1}{6}\right)$

(ii) $\left(\dfrac{24}{35}\div\dfrac{6}{7}+\dfrac{5}{9}\right)\times\dfrac{3}{4}$

(iii) $\dfrac{3}{4}$ of $6\dfrac{1}{8}-\dfrac{2}{3}$ of $2\dfrac{1}{4}$

(iv) $\dfrac{7}{30}$ of $\left(\dfrac{1}{3}+\dfrac{7}{15}\right)\div\left(\dfrac{5}{6}-\dfrac{3}{5}\right)$

(v) $2\dfrac{1}{2}-3\dfrac{1}{2}\times1\dfrac{3}{4}+2\dfrac{1}{2}$

(vi) $4\dfrac{5}{7}\left(3\dfrac{1}{8}\div\dfrac{11}{12}\right)$

(vii) $\dfrac{2}{5}$ of $\left(\dfrac{1}{7}-\dfrac{1}{12}\right)$ of $1\dfrac{2}{5}$

(viii) $\left(\dfrac{1}{2}-\dfrac{1}{3}\right)\left(\dfrac{3}{4}-\dfrac{4}{5}\right)\div\left(\dfrac{1}{2}-\dfrac{2}{5}+\dfrac{1}{7}\right)$

(ix) $\dfrac{5}{6}-\dfrac{3}{5}\left(\dfrac{1}{3}+\dfrac{2}{11}\right)$

(x) $4\dfrac{2}{3}\div\left(3-\dfrac{1}{2}\right)+\left(\dfrac{2}{5}\div1\dfrac{1}{5}\right)$

(xi) $\dfrac{1}{2}$ of $40+1\dfrac{3}{4}$ of $2\dfrac{2}{9}+2\dfrac{1}{5}\times0$

(xii) $\left(1\div2\dfrac{1}{5}\right)\div2\dfrac{1}{5}$ of $2\dfrac{1}{2}-2$

(xiii) $2\dfrac{6}{11}$ of $1\dfrac{2}{7}\div2\dfrac{2}{11}$

Solution:

(i) $\left(\dfrac{1}{2} + \dfrac{1}{3}\right) \div \left(\dfrac{1}{4} - \dfrac{1}{6}\right)$

$= \left(\dfrac{3+2}{6}\right) \div \left(\dfrac{3-2}{12}\right) = \left(\dfrac{5}{6}\right) \div \left(\dfrac{1}{12}\right)$

$= \dfrac{5}{6} \times \dfrac{12}{1} = \mathbf{10}$

(ii) $\left(\dfrac{24}{35} \div \dfrac{6}{7} + \dfrac{5}{9}\right) \times \dfrac{3}{4}$

$= \left(\dfrac{24}{35} \times \dfrac{7}{6} + \dfrac{5}{9}\right) \times \dfrac{3}{4} = \left(\dfrac{4}{5} + \dfrac{5}{9}\right) \times \dfrac{3}{4}$

$= \left(\dfrac{36 + 25}{45}\right) \times \dfrac{3}{4}$

$= \dfrac{61}{45} \times \dfrac{3}{4} = \dfrac{61}{60} = \mathbf{1\dfrac{1}{60}}$

(iii) $\dfrac{3}{4}$ of $6\dfrac{1}{8} - \dfrac{2}{3}$ of $2\dfrac{1}{4}$

$= \dfrac{3}{4}$ of $\dfrac{49}{8} - \dfrac{2}{3}$ of $\dfrac{9}{4}$

$= \dfrac{3}{4} \times \dfrac{49}{8} - \dfrac{2}{3} \times \dfrac{9}{4}$

$= \dfrac{147}{32} - \dfrac{3}{2} = \dfrac{147 - 48}{32} = \dfrac{99}{32}$

$= \mathbf{3\dfrac{3}{32}}$

(iv) $\dfrac{7}{30}$ of $\left(\dfrac{1}{3} + \dfrac{7}{15}\right) \div \left(\dfrac{5}{6} - \dfrac{3}{5}\right)$

$$= \dfrac{7}{30} \text{ of } \left(\dfrac{5+7}{15}\right) \div \left(\dfrac{25-18}{30}\right)$$

$$= \dfrac{7}{30} \times \dfrac{12}{15} \div \left(\dfrac{7}{30}\right)$$

$$= \dfrac{7}{30} \times \dfrac{12}{15} \times \dfrac{30}{7} = \dfrac{12}{15} = \dfrac{4}{5}$$

(v) $2\dfrac{1}{2} - 3\dfrac{1}{2} \times 1\dfrac{3}{4} + 2\dfrac{1}{2}$

$$= \dfrac{5}{2} - \dfrac{7}{2} \times \dfrac{7}{4} + \dfrac{5}{2}$$

$$= \dfrac{5}{2} - \dfrac{49}{8} + \dfrac{5}{2} = \dfrac{5}{2} + \dfrac{5}{2} - \dfrac{49}{8}$$

$$= \dfrac{20 + 20 - 49}{8} = -\dfrac{9}{8} = -1\dfrac{1}{8}$$

(vi) $4\dfrac{5}{7}\left(3\dfrac{1}{8} \div \dfrac{11}{12}\right) = \dfrac{33}{7}\left(\dfrac{25}{8} \div \dfrac{11}{12}\right)$

$$= \dfrac{33}{7}\left(\dfrac{25}{8} \times \dfrac{12}{11}\right) = \dfrac{33}{7}\left(\dfrac{75}{22}\right)$$

$$= \dfrac{33}{7} \times \dfrac{75}{22} = \dfrac{225}{14} = 16\dfrac{1}{14}$$

(vii) $\dfrac{2}{5}$ of $\left(\dfrac{1}{7} - \dfrac{1}{12}\right)$ of $1\dfrac{2}{5}$

$$= \dfrac{2}{5} \text{ of } \left(\dfrac{12-7}{84}\right) \text{ of } \dfrac{7}{5}$$

$$= \dfrac{2}{5} \text{ of } \left(\dfrac{5}{84}\right) \text{ of } \dfrac{7}{5}$$

$$= \dfrac{2}{5} \times \dfrac{5}{84} \times \dfrac{7}{5} = \dfrac{1}{30}$$

(viii) $\left(\dfrac{1}{2} - \dfrac{1}{3}\right)\left(\dfrac{3}{4} - \dfrac{4}{5}\right) \div \left(\dfrac{1}{2} - \dfrac{2}{5} + \dfrac{1}{7}\right)$

$$= \left(\dfrac{3-2}{6}\right)\left(\dfrac{15-16}{20}\right) \div \left(\dfrac{35-28+10}{70}\right)$$

$$= \left(\dfrac{1}{6}\right)\left(\dfrac{-1}{20}\right) \div \left(\dfrac{17}{70}\right) = \dfrac{1}{6} \times \dfrac{-1}{20} \div \dfrac{17}{70}$$

$$= \dfrac{1}{6} \times \dfrac{-1}{20} \times \dfrac{70}{17} = -\dfrac{7}{204}$$

(ix) $\dfrac{5}{6} - \dfrac{3}{5}\left(\dfrac{1}{3} + \dfrac{2}{11}\right) = \dfrac{5}{6} - \dfrac{3}{5}\left(\dfrac{11+6}{33}\right)$

$= \dfrac{5}{6} - \dfrac{3}{5} \times \dfrac{17}{33} = \dfrac{5}{6} - \dfrac{17}{55}$

$= \dfrac{275 - 102}{330} = \dfrac{\mathbf{173}}{\mathbf{330}}$

(x) $4\dfrac{2}{3} \div \left(3 - \dfrac{1}{2}\right) + \left(\dfrac{2}{5} \div 1\dfrac{1}{5}\right)$

$= \dfrac{14}{3} \div \left(3 - \dfrac{1}{2}\right) + \left(\dfrac{2}{5} \div \dfrac{6}{5}\right)$

$= \dfrac{14}{3} \div \left(\dfrac{6-1}{2}\right) + \left(\dfrac{2}{5} \times \dfrac{5}{6}\right)$

$= \dfrac{14}{3} \div \left(\dfrac{5}{2}\right) + \dfrac{1}{3} \qquad = \dfrac{14}{3} \times \dfrac{2}{5} + \dfrac{1}{3}$

$= \dfrac{28}{15} + \dfrac{1}{3} = \dfrac{28+5}{15} = \dfrac{33}{15} = \dfrac{11}{5} = \mathbf{2\dfrac{1}{5}}$

(xi) $\dfrac{1}{2}$ of $40 + 1\dfrac{3}{4}$ of $2\dfrac{2}{9} + 2\dfrac{1}{5} \times 0$

$= \dfrac{1}{2} \times 40 + \dfrac{7}{4} \times \dfrac{20}{9} + \dfrac{11}{5} \times 0$

$= 20 + \dfrac{35}{9} + 0 = \dfrac{180 + 35}{9} = \dfrac{215}{9}$

$= \mathbf{23\dfrac{8}{9}}$

(xii) $\left(1 \div 2\dfrac{1}{5}\right) \div 2\dfrac{1}{5}$ of $2\dfrac{1}{2} - 2$

$= \left(1 \div \dfrac{11}{5}\right) \div \dfrac{11}{5}$ of $\dfrac{5}{2} - 2$

$= \left(1 \times \dfrac{5}{11}\right) \div \dfrac{11}{5}$ of $\dfrac{5}{2} - 2$

$= \dfrac{5}{11} \div \dfrac{11}{5} \times \dfrac{5}{2} - 2 = \dfrac{5}{11} \div \dfrac{11}{2} - 2$

$= \dfrac{5}{11} \times \dfrac{2}{11} - 2 = \dfrac{10}{121} - 2$

$= \dfrac{10 - 242}{121} = -\dfrac{232}{121} = \mathbf{-1\dfrac{111}{121}}$

(xiii) $2\dfrac{6}{11}$ of $1\dfrac{2}{7} \div 2\dfrac{2}{11}$

$$= \frac{28}{11} \text{ of } \frac{9}{7} \div \frac{24}{11}$$

$$= \frac{28}{11} \times \frac{9}{7} \div \frac{24}{11} = \frac{36}{11} \div \frac{24}{11}$$

$$= \frac{36}{11} \times \frac{11}{24} = \frac{3}{2} = 1\frac{1}{2}$$

EXERCISE 14(E)

Question 1.

From a rope of $10\frac{1}{2}$ m long, $4\frac{5}{8}$ m is cut off. Find the length of the remaining rope.

Solution:

Length of rope $= 10\frac{1}{2}m$

Length of cut off rope $= 4\frac{5}{8}m$

Remaining rope $= \left(10\frac{1}{2}m - 4\frac{5}{8}m\right)$

$$= \frac{21}{2}m - \frac{37}{8}m$$

$$= \frac{84-37}{8} = \frac{47}{8} = 5\frac{7}{8}m.$$

Question 2.

A piece of cloth is 5 metre long. After washing, it shrinks by $\frac{1}{25}$ of its length. What is the length of the cloth after washing?

Solution:

Length of a piece of cloth $= 5$ m

After washing, it is shrinked

$$= \frac{1}{25} \text{ of } 5 \text{ m} = \frac{1}{5} \text{ m}$$

Length of cloth after washing

$$= \left(5 - \frac{1}{5}\right) m$$

$$= \frac{25-1}{5} = \frac{24}{5} \text{ m} = 4\frac{4}{5} \text{ m}$$

Question 3.

I bought wheat worth Rs. $12\frac{1}{2}$, rice worth Rs. $25\frac{3}{4}$ and vegetables worth Rs. $10\frac{1}{4}$. If I gave a hundred-rupee note to the shopkeeper; how much did he return to me

Solution:

Money given to Shopkeeper = Rs. 100

Total Amount of goods bought

$= Rs.\left(12\frac{1}{2} + 25\frac{3}{4} + 10\frac{1}{4}\right)$

(Wheat, Rice and Vegetable)

$= \frac{25}{2} + \frac{103}{4} + \frac{41}{4}$

$= \frac{50 + 103 + 41}{4} = Rs.\frac{194}{4}$

∴ Money returned by shopkeeper

$= Rs.\left(100 - \frac{194}{4}\right) = Rs.\frac{400 - 194}{4}$

$= \frac{206}{4} = Rs.\frac{103}{2} = Rs.\,51\frac{1}{2}.$

Question 4.

Out of 500 oranges in a box, $\frac{3}{25}$ are rotten and $\frac{1}{5}$ are kept for some guests. How many oranges are left in the box?

Solution:

Number of oranges = 500

Bad oranges $= \frac{3}{25}$ of $500 = \frac{3}{25} \times 500$

$= 60$

Kept for guests $= \frac{1}{5}$ of 500

$= \frac{1}{5} \times 500 = 100$

∴ No of oranges which can be used

$= 500 - 60 - 100 = 500 - 160 = \textbf{340.}$

Question 5.

An ornament piece is made of gold and copper. Its total weight is 96g. If $\frac{1}{12}$ of the ornament hi copper, find the weight of gold in it.

Solution:

Total weight = 96 g

Weight of copper $= \frac{1}{12}$ of 96

$= \frac{1}{12} \times 96 = 8$ gm

∴ Weight of gold = Total weight − weight of copper = 96g − 8g = **88g**

Question 6.
A girl did half of some work on Monday and one-third of it on Tuesday. How much will she have to do on Wednesday in order to complete the work?
Solution:
Let total work done = 1

Work done on Monday = $\dfrac{1}{2}$

Work done on Tuesday = $\dfrac{1}{3}$

Work done on Wednesday = remaining work

$= 1 - \left(\dfrac{1}{2} + \dfrac{1}{3}\right)$

$= 1 - \dfrac{3+2}{6} = 1 - \dfrac{5}{6}$

$= \dfrac{6-5}{6} = \dfrac{1}{6}$

Work done on Wednesday = $\dfrac{1}{6}$ of work

Question 7.
A man spends $\dfrac{3}{8}$ of his money and 8 still has Rs. 720 left with him. How much money did he have at first ?
Solution:
Let a man has money = Re. 1

Amount spent = $\dfrac{3}{8}$ of Re. 1 = Rs. $\dfrac{3}{8}$

Amount left = $1 - \dfrac{3}{8} = \dfrac{8-3}{8} = $ Re. $\dfrac{5}{8}$

$\therefore$ $\dfrac{5}{8}$ of his total money = Rs. 720

$\therefore$ Total money = Rs. $\dfrac{720 \times 8}{5}$

= Rs. 144 × 8 = Rs. 1152

Question 8.
In a school, $\dfrac{4}{5}$ of the students are boys, and the number of girls is 100. Find the number

of boys.
Solution:

Let the total number of boys and girls $=x$

Total number of boys $= \dfrac{4}{5}$ of $x = \dfrac{4x}{5}$

According to question, total strength of School,

$$x - \dfrac{4x}{5} = 100$$

$$\dfrac{5x - 4x}{5} = 100$$

$$\dfrac{x}{5} = 100 \Rightarrow x = 500$$

$\therefore$ Number of boys = total strength – girls

$$= 500 - 100 = \mathbf{400.}$$

Question 9.

After finishing $\frac{3}{4}$ of my journey, I find that 12 km of my journey is covered. How much distance is still left to be covered ?
Solution:

Let the total journey $= x$,

distance covered $= \dfrac{3}{4} = 12\,\text{km}$

Then, according to question $\dfrac{3}{4}$ of $x = 12$ km

$$x = 12 \times \dfrac{4}{3} \qquad \Rightarrow x = \mathbf{16\ km}$$

Distance left = total distance – distance cover $= 16 - 12 = \mathbf{4\ km.}$

Question 10.

When Ajit travelled 15 km, he found that one-fourth of his journey was still left. What was the full length of the journey?

Solution:

Let the total length of journey = x

Journey travelled = 15 km

Journey still left = $\dfrac{1}{4}$ of x

Now, according to question,

$$x - 15 = \dfrac{1}{4} \text{ of } x$$

$$x - 15 = \dfrac{x}{4}$$

$$x - \dfrac{x}{4} = 15$$

$$\dfrac{4x - x}{4} = 15$$

$$3x = 15 \times 4$$

$$x = \dfrac{15 \times 4}{3} = 20 \text{ km}$$

∴ Total length of the journey = **20 km.**

Question 11.

In a particular month, a man earns Rs. 7,200. Out of this income, he spends $\dfrac{3}{10}$ on food, $\dfrac{1}{4}$ on house rent, $\dfrac{1}{10}$ on insurance and $\dfrac{2}{25}$ on holidays. How much did he save in that month ?

Solution:

Earning of a man in a particular month
= Rs. 7200

Amount spent on food $= \dfrac{3}{10}$ of Rs. 7200

= Rs. 2160

Amount spent on house rent

$= \dfrac{1}{4}$ of Rs. 7200 = Rs. 1800

Amount spent on insurance

$= \dfrac{1}{10}$ of Rs. 7200 = Rs. 720

Amount spent on holidays

$= \dfrac{2}{25}$ of Rs. 7200

= Rs. 2 × 288 = Rs. 576

∴ Total amount spent = Rs. (2160 + 1800 + 720 + 576) = Rs. 5256

∴ Amount saved = Rs. 7200 − Rs. 5256
= Rs. 1944

REVISION EXERCISE

Question 1.

Show that $\dfrac{3}{7}$ lies between $\dfrac{2}{5}$ and $\dfrac{5}{7}$.

Solution:

$\dfrac{3}{7}$ will lie between $\dfrac{2}{5}$ and $\dfrac{5}{7}$ if

$\dfrac{2}{5} > \dfrac{3}{7} > \dfrac{5}{7}$ or $\dfrac{2}{5} < \dfrac{3}{7} < \dfrac{5}{7}$

Now, comparing $\dfrac{2}{5}, \dfrac{3}{7}, \dfrac{5}{7}$

L.C.M. of 5 and 7 = 35

$\therefore \dfrac{2}{5} = \dfrac{2 \times 7}{5 \times 7} = \dfrac{14}{35}$

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

and $\dfrac{5}{7} = \dfrac{5 \times 5}{7 \times 5} = \dfrac{25}{35}$

$\therefore \dfrac{14}{35} < \dfrac{15}{35} < \dfrac{25}{35}$

$\dfrac{2}{5} < \dfrac{3}{7} < \dfrac{5}{7}$

$\dfrac{3}{7}$ lies between $\dfrac{2}{5}$ and $\dfrac{5}{7}$

Question 2.

Show that $\dfrac{4}{5}$ lies between $\dfrac{3}{4}$ and $\dfrac{5}{6}$.

Solution:

$$\frac{3}{4} > \frac{4}{5} > \frac{5}{6} \text{ or } \frac{3}{4} < \frac{4}{5} < \frac{5}{6}$$

Now L.C.M. of 4, 5, 6 = 60

$$\therefore \quad \frac{3}{4} = \frac{3 \times 15}{4 \times 15} = \frac{45}{60}$$

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

$$\frac{5}{6} = \frac{5 \times 10}{6 \times 10} = \frac{50}{60}$$

$$\therefore \quad \frac{45}{60} < \frac{48}{60} < \frac{50}{60}$$

$$\Rightarrow \quad \frac{3}{4} < \frac{4}{5} < \frac{5}{6}$$

Hence $\frac{4}{5}$ lies between $\frac{3}{4}$ and $\frac{5}{6}$

Question 3.

Evaluate :

(i) $3\frac{5}{6} - 1\frac{4}{15} - \left(3\frac{2}{9} - 1\frac{3}{5}\right)$

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

(iii) $\frac{5}{6}$ of $\frac{3}{4} \div \frac{7}{8} \times 1\frac{1}{2}$

(iv) $\frac{1}{3} + \frac{7}{9} \div \left(\frac{7}{10} \times 1\frac{1}{4}\right)$

(v) $1\frac{4}{13}$ of $2\frac{2}{7} \div \frac{68}{91} - \left(1\frac{1}{2} - 1\frac{1}{3}\right)$

(vi) $8 - \left\{5\frac{1}{3} - \left(3 - 2\frac{1}{2}\right)\right\}$

Solution:

(i) $3\frac{5}{6} - 1\frac{4}{15} - \left(3\frac{2}{9} - 1\frac{3}{5}\right)$

$= \frac{23}{6} - \frac{19}{15} - \left(\frac{29}{9} - \frac{8}{5}\right)$

$$= \frac{23}{6} - \frac{19}{15} - \frac{29}{9} + \frac{8}{5}$$

$$= \frac{345 - 114 - 290 + 144}{90}$$

L.C.M. of 6, 15, 9, 5 = 90

$$= \frac{345 + 144 - 114 - 290}{90} = \frac{489 - 404}{90}$$

$$= \frac{85}{90} = \frac{85 \div 5}{90 \div 5} = \frac{17}{18}$$

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

$$= \frac{3}{4} \text{ of } \frac{3}{2} \div \frac{9}{2}$$

$$= \frac{9}{8} \div \frac{9}{2} \qquad \text{(first remove 'of')}$$

$$= \frac{9}{8} \times \frac{2}{9} = \frac{1}{4}$$

(iii) $\frac{5}{6}$ of $\frac{3}{4} \div \frac{7}{8} \times 1\frac{1}{2}$

$$= \frac{5}{6} \text{ of } \frac{3}{4} \div \frac{7}{8} \times \frac{3}{2}$$

$$= \frac{5}{8} \div \frac{7}{8} \times \frac{3}{2} \qquad \text{(first remove of)}$$

$$= \frac{5}{8} \times \frac{8}{7} \times \frac{3}{2} \qquad \text{(then remove ÷)}$$

$$= \frac{15}{14} = 1\frac{1}{14}$$

(iv) $\frac{1}{3} + \frac{7}{9} \div \left(\frac{7}{10} \times 1\frac{1}{4} \right)$

$$= \frac{1}{3} + \frac{7}{9} \div \left(\frac{7}{10} \times \frac{5}{4} \right)$$

$$= \frac{1}{3} + \frac{7}{9} \div \frac{7}{8} \qquad \text{(remove bracket)}$$

$$= \frac{1}{3} + \frac{7}{9} \times \frac{8}{7} \qquad \text{(remove ÷)}$$

$$= \frac{1}{3} + \frac{8}{9}$$

$$= \frac{3+8}{9} = \frac{11}{9} = 1\frac{2}{9}$$

(v) $1\frac{4}{13}$ of $2\frac{2}{7} \div \frac{68}{91} - \left(1\frac{1}{2} - 1\frac{1}{3}\right)$

$$= \frac{17}{13} \text{ of } \frac{16}{7} \div \frac{68}{91} - \left(\frac{3}{2} - \frac{4}{3}\right)$$

$$= \frac{17}{13} \text{ of } \frac{16}{7} \div \frac{68}{91} - \frac{3}{2} + \frac{4}{3}$$

$$\text{(remove bracket)}$$

$$= \frac{272}{91} \div \frac{68}{91} - \frac{3}{2} + \frac{4}{3} \qquad \text{(remove 'of')}$$

$$= \frac{272}{91} \times \frac{91}{68} - \frac{3}{2} + \frac{4}{3}$$

$$= \frac{4}{1} - \frac{3}{2} + \frac{4}{3} \qquad \text{(remove '×')}$$

$$= \frac{24-9+8}{6} = \frac{32-9}{6}$$

$$= \frac{23}{6} = 3\frac{5}{6}$$

(vi) $8 - \left\{5\frac{1}{3} - \left(3 - 2\frac{1}{2}\right)\right\}$

$$= 8 - \left\{\frac{16}{3} - \left(3 - \frac{5}{2}\right)\right\}$$

$$= 8 - \left\{\frac{16}{3} - 3 + \frac{5}{2}\right\}$$

$$= \frac{8}{1} - \frac{16}{3} + \frac{3}{1} - \frac{5}{2}$$

$$= \frac{48-32+18-15}{6} = \frac{48+18-32-15}{6}$$

$$= \frac{66-47}{6} = \frac{19}{6} = 3\frac{1}{6}$$

Question 4.

Mr. Mehra gave one-third of his money to his son, one-fifth of his money to his daughter and the remaining amount to his wife. If his wife got Rs. 91,000, how much money did Mr. Mehra have originally?

Solution:

Let Mr. Mehra has money = 1

Money given to his son = $\dfrac{1}{3}$

and money given to his daughter = $\dfrac{1}{5}$

∴ Remaining money given to his wife

$$= 1 - \left(\dfrac{1}{3} + \dfrac{1}{5}\right)$$

$$= 1 - \dfrac{5+3}{15}$$

$$= 1 - \dfrac{8}{15} = \dfrac{15-8}{15} = \dfrac{7}{15}$$

∴ $\dfrac{7}{15}$ of his money = Rs. 91000

∴ Total money = Rs. $\dfrac{91000 \times 15}{7}$

= Rs. 13,000 × 15 = Rs. 1,95,000

Question 5.

A sum of Rs. 84,000 is divided among three persons A, B and C. If A gets one-fourth of it and B gets one-fifth of it; how much did C get ?

Solution:

Total money = Rs. 84,000

A gets = $\dfrac{1}{4}$ of 84,000 = Rs. 21,000

B gets = $\dfrac{1}{5}$ of 84,000 = Rs. 16,800

∴ C gets remaining money
∴ C's share = Rs. 84,000 – (Rs. 21,000 + Rs. 16,800)

= Rs. 84,000 – (37,800) = Rs. 46,200

Question 6.

In one hour Rohit walks $3\frac{2}{5}$ km. How much distance will he cover in $2\frac{1}{2}$ hours?

Solution:

Distance covered in 1 hour $= 3\dfrac{2}{5} = \dfrac{17}{5}$ km

Distance covered in $2\dfrac{1}{2}$ hours

$= 3\dfrac{2}{5} \times 2\dfrac{1}{2}$ km $= \dfrac{17}{5} \times \dfrac{5}{2}$ km

$= \dfrac{17}{2} = 8\dfrac{1}{2}$ km

Question 7.

An 84 m long string is cut into pieces each of length $5\dfrac{1}{4}$ m. How many pieces are obtained ?

Solution:

Length of string = 84 m

Length of each piece $= 5\dfrac{1}{4}$ m $= \dfrac{21}{4}$ m

Number of pieces $= 84 \div \dfrac{21}{4}$

$= 84 \times \dfrac{4}{21} = 4 \times 4 = 16$

Question 8.

In buying a ready made shirt-two-fifths of my pocket money is spent If Rs. 540 is still left with me, find :
(i) The money I had before I bought the shirt.
(ii) The emit of the shirt
Solution:

Let total money in the pocket = 1

Amount spent on shirt = $\dfrac{2}{5}$

Balance amount = $1 - \dfrac{2}{5} = \dfrac{5-2}{5} = \dfrac{3}{5}$

Now $\dfrac{3}{5}$ of total money = Rs. 540

(i) ∴ Total money = Rs. 540 × $\dfrac{5}{3}$ = 180 × 5

= Rs. 900

(ii) Cost of shirt = $\dfrac{2}{5}$ of Rs. 900 = Rs. 2 × 180

= Rs. 360

Question 9.
Mohan leaves Rs. 1,20,000 to his wife and three children such that two-fifths of this money is given to his wife and the remaining is distributed equally among the children. Find, how much each child gets ?
Solution:
Total amount = Rs. 12,0,000

Amount given to his wife = $\dfrac{2}{5}$ of Rs. 1,20,000
= Rs. 2 x 24,000 = Rs. 48,000
Remaining amount = Rs. 120000 – Rs. 48000 = Rs. 72000
This amount is distributed among three children equally.
Each's share = Rs. 72,000 x $\dfrac{1}{3}$ = Rs. 24,000

Question 10.
Simplify :

(i) $3\dfrac{5}{8}$ of $2\dfrac{2}{3} \div 1\dfrac{3}{8}$

(ii) $\left(1 \div 3\dfrac{1}{3}\right) \times 3\dfrac{1}{3}$ of $7\dfrac{2}{9} - 6$

(iii) $\dfrac{3}{4} \times 1\dfrac{1}{3} \div \dfrac{3}{7}$ of $2\dfrac{5}{8}$

Solution:

(i) $3\dfrac{5}{8}$ of $2\dfrac{2}{3} \div 1\dfrac{3}{8}$

$$= \frac{29}{8} \text{ of } \frac{8}{3} \div \frac{11}{8}$$

$$= \frac{29}{3} \div \frac{11}{8} \qquad \text{(Removing 'of')}$$

$$= \frac{29}{3} \times \frac{8}{11} = \frac{232}{33} = 7\frac{1}{33}$$

(ii) $\left(1 \div 3\frac{1}{3}\right) \times 3\frac{1}{3} \text{ of } 7\frac{2}{9} - 6$

$$= \left(1 \div \frac{10}{3}\right) \times \frac{10}{3} \text{ of } \frac{65}{9} - 6$$

$$= \left(1 \times \frac{3}{10}\right) \times \frac{10}{3} \text{ of } \frac{65}{9} - 6$$

$$= \frac{3}{10} \times \frac{10}{3} \text{ of } \frac{65}{9} - 6 \qquad \text{(Removing bracket)}$$

$$= \frac{3}{10} \times \frac{650}{27} - \frac{6}{1} \qquad \text{(Removing 'of')}$$

$$= \frac{65}{9} - \frac{6}{1} \qquad \text{(Removing '×')}$$

$$= \frac{65 - 54}{9} = \frac{11}{9} = 1\frac{2}{9}$$

(iii) $\frac{3}{4} \times 1\frac{1}{3} \div \frac{3}{7} \text{ of } 2\frac{5}{8}$

$$= \frac{3}{4} \times \frac{4}{3} \div \frac{3}{7} \text{ of } \frac{21}{8}$$

$$= \frac{3}{4} \times \frac{4}{3} \div \frac{9}{8} \qquad \text{(Removing 'of')} \quad .$$

$$= \frac{3}{4} \times \frac{4}{3} \times \frac{8}{9} \qquad \text{(Removing ÷)}$$

$$= \frac{8}{9}$$