

## Chapter 1 FRACTIONS

### ❖ Important points

- A fraction is a part or parts of a whole .
- A fraction is written in the form of  $\frac{\text{numerator}}{\text{denominator}}$
- The numerator represents the number of parts being referred to
- The denominator represents the total number of equal parts of a whole
- **Equivalent Fractions** : Fractions that represent the same part of the whole are called equivalent fractions
- **Like Fractions**: Fractions with the same denominator are called like fractions .
- **Unlike Fractions**: fractions with different denominators are called unlike fractions .
- **Proper fractions**: fractions whose numerator is less than the denominator are called proper fractions . They are always smaller than 1.
- **Improper fractions** : Fractions whose numerator is greater than or equal to the denominator are called improper fraction . They are always greater than or equal to 1
- **Mixed Fractions** : Fractions that can be expressed as a whole number and a proper fraction is called a mixed fraction .Mixed fraction is always greater than 1

### Exercise – 1

1 write the following fractions in numbers :

a) two - fifths =  $\frac{2}{5}$

b) one – sixth =  $\frac{1}{6}$

f) one quarter =  $\frac{1}{4}$

Practice c , d ,e in rough copy

## Exercise-2

1. (a)  $\frac{2}{6}$ ,  $\frac{4}{12}$ , yes, the fractions are equivalent.

(b)  $\frac{1}{12}$ ,  $\frac{1}{6}$ , no, the fractions are not equivalent.

2. (a)  $\frac{25}{30} = \frac{25 \div \boxed{5}}{30 \div \boxed{5}} = \frac{5}{6}$       (b)  $\frac{6}{7} = \frac{6 \times \boxed{7}}{7 \times \boxed{7}} = \frac{\boxed{42}}{49}$

3. (a)  $\frac{3}{5} = \frac{3 \times 2}{5 \times 2} = \frac{6}{10}$  ;  $\frac{3}{5} = \frac{3 \times 3}{5 \times 3} = \frac{9}{15}$ ,  $\frac{3}{5} = \frac{3 \times 4}{5 \times 4} = \frac{12}{20}$ ,  $\frac{3}{5} = \frac{3 \times 5}{5 \times 5} = \frac{15}{25}$

The first five fractions equivalent to  $\frac{3}{5}$  are  $\frac{3}{5}$ ,  $\frac{6}{10}$ ,  $\frac{9}{15}$ ,  $\frac{12}{20}$ ,  $\frac{15}{25}$ .

(b)  $\frac{2}{7} = \frac{2 \times 2}{7 \times 2} = \frac{4}{14}$ ,  $\frac{2}{7} = \frac{2 \times 3}{7 \times 3} = \frac{6}{21}$ ,  $\frac{2}{7} = \frac{2 \times 4}{7 \times 4} = \frac{8}{28}$ ,  $\frac{2}{7} = \frac{2 \times 5}{7 \times 5} = \frac{10}{35}$

The first five fractions equivalent to  $\frac{2}{7}$  are  $\frac{2}{7}$ ,  $\frac{4}{14}$ ,  $\frac{6}{21}$ ,  $\frac{8}{28}$ ,  $\frac{10}{35}$ .

(c)  $\frac{5}{6} = \frac{5 \times 2}{6 \times 2} = \frac{10}{12}$ ,  $\frac{5}{6} = \frac{5 \times 3}{6 \times 3} = \frac{15}{18}$ ,  $\frac{5}{6} = \frac{5 \times 4}{6 \times 4} = \frac{20}{24}$ ,  $\frac{5}{6} = \frac{5 \times 5}{6 \times 5} = \frac{25}{30}$

The first five fractions equivalent to  $\frac{5}{6}$  are  $\frac{5}{6}$ ,  $\frac{10}{12}$ ,  $\frac{15}{18}$ ,  $\frac{20}{24}$ ,  $\frac{25}{30}$ .

(d)  $\frac{4}{11} = \frac{4 \times 2}{11 \times 2} = \frac{8}{22}$ ,  $\frac{4}{11} = \frac{4 \times 3}{11 \times 3} = \frac{12}{33}$ ,  $\frac{4}{11} = \frac{4 \times 4}{11 \times 4} = \frac{16}{44}$ ,  $\frac{4}{11} = \frac{4 \times 5}{11 \times 5} = \frac{20}{55}$

The first five fractions equivalent to  $\frac{4}{11}$  are  $\frac{4}{11}$ ,  $\frac{8}{22}$ ,  $\frac{12}{33}$ ,  $\frac{16}{44}$ ,  $\frac{20}{55}$ .

4. (a)  $\frac{21}{49} = \frac{3 \times 7}{7 \times 7}$ ,  $\frac{9}{21} = \frac{3 \times 3}{7 \times 3}$ ,  $\frac{3}{7} = \frac{3 \times 1}{7 \times 1}$ ,  $\frac{12}{21} = \frac{3 \times 4}{7 \times 3}$

So,  $\frac{12}{21}$  is not equivalent to others.

(b)  $\frac{15}{27} = \frac{5 \times 3}{9 \times 3}$ ,  $\frac{5}{9} = \frac{5 \times 1}{9 \times 1}$ ,  $\frac{45}{72} = \frac{5 \times 9}{9 \times 8}$ ,  $\frac{10}{18} = \frac{5 \times 2}{9 \times 2}$

So,  $\frac{45}{72}$  is not equivalent to others.

(c)  $\frac{18}{20} = \frac{3 \times 6}{4 \times 5}$ ,  $\frac{3}{4} = \frac{3 \times 1}{4 \times 1}$ ,  $\frac{9}{12} = \frac{3 \times 3}{4 \times 3}$ ,  $\frac{15}{20} = \frac{3 \times 5}{4 \times 5}$

So,  $\frac{18}{20}$  is not equivalent to others.

(d)  $\frac{14}{70} = \frac{1 \times 14}{5 \times 14}$ ,  $\frac{1}{5} = \frac{1 \times 1}{5 \times 1}$ ,  $\frac{6}{15} = \frac{1 \times 6}{5 \times 3}$ ,  $\frac{3}{15} = \frac{1 \times 3}{5 \times 3}$

So,  $\frac{6}{15}$  is not equivalent to others.

5. (a)  $\frac{3}{7} = \frac{3 \times 5}{7 \times 5} = \frac{15}{35}$

So,  $\frac{15}{35}$  is an equivalent fraction of  $\frac{3}{7}$  with numerator 15.

(b)  $\frac{3}{7} = \frac{3 \times 6}{7 \times 6} = \frac{18}{42}$

So,  $\frac{18}{42}$  is an equivalent fraction of  $\frac{3}{7}$  with denominator 42.

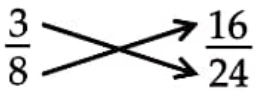
(c)  $\frac{3}{7} = \frac{3 \times 9}{7 \times 9} = \frac{27}{63}$

So,  $\frac{27}{63}$  is an equivalent fraction of  $\frac{3}{7}$  with numerator 27.

$$(d) \frac{3}{7} = \frac{3 \times 11}{7 \times 11} = \frac{33}{77}$$

So,  $\frac{33}{77}$  is an equivalent fraction of  $\frac{3}{7}$  with denominator 77.

6. (a) Cross multiply the numerator of the 1st fraction with the denominator of the 2nd fraction and the denominator of the 1st fraction with the numerator of the 2nd fraction.

We have,  $\frac{3}{8}$  and  $\frac{16}{24}$  

$$\Rightarrow 3 \times 24 = 72, 8 \times 16 = 128$$

So,  $\frac{3}{8}$  and  $\frac{16}{24}$  are not equivalent fractions.

(b) 

$\Rightarrow 2 \times 25 = 50, 5 \times 10 = 50 \quad \therefore \frac{2}{5}$  and  $\frac{10}{25}$  are equivalent fractions.

(c) 

$\Rightarrow 6 \times 49 = 294, 7 \times 42 = 294 \quad \therefore \frac{6}{7}$  and  $\frac{42}{49}$  are equivalent fractions.

### Exercise-3

1. We first find the HCF of 48 and 64.

Factors of 48 are  $\textcircled{1}, \textcircled{2}, 3, \textcircled{4}, 6, \textcircled{8}, 12, \textcircled{16}, 24, 48$ .

Factors of 64 are  $\textcircled{1}, \textcircled{2}, \textcircled{4}, \textcircled{8}, \textcircled{16}, 32, 64$ .

Common factors are 1, 2, 4, 8, 16.

$$\therefore \text{HCF} = 16$$

So, we divide 48 and 64 by 16.

$$\frac{48}{64} = \frac{48 \div 16}{64 \div 16} = \frac{3}{4}$$

Thus,  $\frac{48}{64}$  in the lowest terms is  $\frac{3}{4}$ .

2.  $\frac{15}{20} = \frac{15 \div 5}{20 \div 5} = \frac{3}{4}$  (HCF of 15 and 20 = 5)
3.  $\frac{35}{45} = \frac{35 \div 5}{45 \div 5} = \frac{7}{9}$  (HCF of 35 and 45 = 5)

4.  $\frac{49}{63} = \frac{49 \div 7}{63 \div 7} = \frac{7}{9}$  (HCF of 49 and 63 = 7)
5.  $\frac{12}{18} = \frac{12 \div 6}{18 \div 6} = \frac{2}{3}$  (HCF of 12 and 18 = 6)
6.  $\frac{36}{81} = \frac{36 \div 9}{81 \div 9} = \frac{4}{9}$  (HCF of 36 and 81 = 9)
7.  $\frac{22}{121} = \frac{22 \div 11}{121 \div 11} = \frac{2}{11}$  (HCF of 22 and 121 = 11)
8.  $\frac{42}{48} = \frac{42 \div 6}{48 \div 6} = \frac{7}{8}$  (HCF of 42 and 48 = 6)
9.  $\frac{24}{32} = \frac{24 \div 8}{32 \div 8} = \frac{3}{4}$  (HCF of 24 and 32 = 8)
10.  $\frac{85}{100} = \frac{85 \div 5}{100 \div 5} = \frac{17}{20}$  (HCF of 85 and 100 = 5)
11.  $\frac{75}{80} = \frac{75 \div 5}{80 \div 5} = \frac{15}{16}$  (HCF of 75 and 80 = 5)
12.  $\frac{25}{40} = \frac{25 \div 5}{40 \div 5} = \frac{5}{8}$  (HCF of 25 and 40 = 5)

### Fun Time

The fraction  $= 1 = \frac{2}{2} = \frac{3}{3} = \frac{4}{4} = \dots$  looks same even if we turn it upside down.

### Exercise-4

1.  $\frac{2}{7}, \frac{4}{7}, \frac{6}{7}, \frac{11}{7}$  and  $\frac{3}{7}$  are like fractions with same denominator 7.
2. (a) numerator < denominator, it is a proper fraction.  
 (b) numerator > denominator, it is an improper fraction.  
 (c) numerator < denominator, it is a proper fraction.  
 (d) numerator > denominator, it is an improper fraction.  
 (e) numerator < denominator, it is a proper fraction.  
 (f) numerator < denominator, it is a proper fraction.  
 (g) numerator < denominator, it is a proper fraction.  
 (h) numerator > denominator, it is an improper fraction.  
 (i) numerator < denominator, it is a proper fraction.  
 (j) numerator > denominator, it is an improper fraction.

$$3. \text{ (a) } \frac{15}{7} = 2\frac{1}{7} \quad \begin{array}{r} 7 \overline{) 15} \\ -14 \\ \hline 1 \end{array}$$

$$\text{ (b) } \frac{8}{3} = 2\frac{2}{3}$$

$$\begin{array}{r} 3 \overline{) 8} \\ -6 \\ \hline 2 \end{array}$$

$$\text{ (c) } \frac{18}{4} = 4\frac{2}{4}$$

$$\begin{array}{r} 4 \overline{) 18} \\ -16 \\ \hline 2 \end{array}$$

$$\text{ (d) } \frac{25}{6} = 4\frac{1}{6}$$

$$\begin{array}{r} 4 \overline{) 25} \\ -24 \\ \hline 1 \end{array}$$

$$\text{ (e) } \frac{44}{5} = 8\frac{4}{5}$$

$$\begin{array}{r} 8 \overline{) 44} \\ -40 \\ \hline 4 \end{array}$$

$$\text{ (f) } \frac{35}{6} = 5\frac{5}{6}$$

$$\begin{array}{r} 5 \overline{) 35} \\ -30 \\ \hline 5 \end{array}$$

$$\text{ (g) } \frac{17}{2} = 8\frac{1}{2}$$

$$\begin{array}{r} 8 \overline{) 17} \\ -16 \\ \hline 1 \end{array}$$

$$\text{ (h) } \frac{54}{5} = 10\frac{4}{5}$$

$$\begin{array}{r} 10 \overline{) 54} \\ -50 \\ \hline 4 \\ -0 \\ \hline 4 \end{array}$$

$$\text{ (i) } \frac{92}{11} = 8\frac{4}{11}$$

$$\begin{array}{r} 8 \overline{) 92} \\ -88 \\ \hline 4 \end{array}$$

$$\text{ (j) } \frac{80}{7} = 11\frac{3}{7}$$

$$\begin{array}{r} 11 \overline{) 80} \\ -77 \\ \hline 3 \\ -0 \\ \hline 3 \end{array}$$

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

$$\text{ (b) } 3\frac{3}{5} = \frac{5 \times 3 + 3}{5} = \frac{15 + 3}{5} = \frac{18}{5}$$

$$\text{ (c) } 2\frac{2}{7} = \frac{7 \times 2 + 2}{7} = \frac{14 + 2}{7} = \frac{16}{7}$$

$$\text{ (d) } 4\frac{1}{2} = \frac{2 \times 4 + 1}{2} = \frac{8 + 1}{2} = \frac{9}{2}$$

$$\text{ (e) } 2\frac{1}{9} = \frac{9 \times 2 + 1}{9} = \frac{18 + 1}{9} = \frac{19}{9}$$

$$\text{ (f) } 8\frac{3}{4} = \frac{4 \times 8 + 3}{4} = \frac{32 + 3}{4} = \frac{35}{4}$$

$$\text{ (g) } 7\frac{2}{5} = \frac{5 \times 7 + 2}{5} = \frac{35 + 2}{5} = \frac{37}{5}$$

$$(h) 9\frac{3}{7} = \frac{7 \times 9 + 3}{7} = \frac{63 + 3}{7} = \frac{66}{7}$$

$$(i) 5\frac{7}{9} = \frac{9 \times 5 + 7}{9} = \frac{45 + 7}{9} = \frac{52}{9}$$

$$(j) 6\frac{5}{8} = \frac{8 \times 6 + 5}{8} = \frac{48 + 5}{8} = \frac{53}{8}$$

### Exercise-5

1. (a)  $\frac{3}{7} < \frac{5}{7}$ , The fraction with greater numerator is greater for like fractions.

$$(b) \frac{11}{12} > \frac{10}{12} \quad (c) \frac{4}{5} = \frac{4}{5}$$

- (d)  $\frac{3}{7} < \frac{3}{5}$ , The fraction with smaller denominator is greater for unlike fractions with same numerator.

$$(e) \frac{16}{5} < \frac{16}{3} \quad (f) \frac{1}{12} < \frac{1}{6} \quad (g) \frac{2}{3} < \frac{4}{5}, 10 < 12, \text{ so, } \frac{2}{3} < \frac{4}{5}$$

$$(h) \frac{5}{9} < \frac{20}{23}, 115 < 180, \text{ so, } \frac{5}{9} < \frac{20}{23}$$

2. (a) The fraction with greater numerator is greater for like fractions.

$$\therefore \frac{1}{7} < \frac{2}{7} < \frac{3}{7} < \frac{4}{7} < \frac{6}{7}$$

- (b) The fraction with smaller denominator is greater for unlike fractions with same numerator.

$$\therefore \frac{5}{12} < \frac{5}{9} < \frac{5}{7} < \frac{5}{6} < \frac{5}{3}$$

- (c)  $\frac{1}{3}, \frac{5}{6}, \frac{7}{12}, \frac{3}{4}, \frac{1}{2}$  are unlike fractions. So, we convert them into like fractions first.

Multiples of 3 are 3, 6, 9, (12), 15, 18.

Multiples of 6 are 6, (12), 18, 24, 30, 36.

Multiples of 12 are (12), 24, 36, 48, 60, 72.

Multiples of 4 are 4, 8, (12), 16, 20, 24.

Multiples of 2 are 2, 4, 6, 8, 10, (12).

LCM of 3, 6, 12, 4 and 2 is 12.

$$\frac{1}{3} = \frac{1 \times 4}{3 \times 4} = \frac{4}{12}, \quad \frac{5}{6} = \frac{5 \times 2}{6 \times 2} = \frac{10}{12}, \quad \frac{7}{12} = \frac{7 \times 1}{12 \times 1} = \frac{7}{12},$$

$$\frac{3}{4} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12}, \quad \frac{1}{2} = \frac{1 \times 6}{2 \times 6} = \frac{6}{12}.$$

Now  $\frac{4}{12} < \frac{6}{12} < \frac{7}{12} < \frac{9}{12} < \frac{10}{12}$

$$\therefore \frac{1}{3} < \frac{1}{2} < \frac{7}{12} < \frac{3}{4} < \frac{5}{6}$$

3. (a)  $\frac{6}{7} > \frac{5}{7} > \frac{4}{7} > \frac{3}{7} > \frac{1}{7}$  ( $\because 6 > 5 > 4 > 3 > 1$ )

(b)  $\frac{5}{6}, \frac{3}{9}, \frac{17}{36}, \frac{9}{4}$  are unlike fractions, so, we convert them into like fractions first.

LCM of 6, 9, 36, 4 = 36

$$\frac{5}{6} = \frac{5 \times 6}{6 \times 6} = \frac{30}{36}, \quad \frac{3}{9} = \frac{3 \times 4}{9 \times 4} = \frac{12}{36}, \quad \frac{17}{36} = \frac{17 \times 1}{36 \times 1} = \frac{17}{36},$$

$$\frac{9}{4} = \frac{9 \times 9}{4 \times 9} = \frac{81}{36}.$$

$$\therefore \frac{81}{36} > \frac{30}{36} > \frac{17}{36} > \frac{12}{36} \quad \text{or} \quad \frac{9}{4} > \frac{5}{6} > \frac{17}{36} > \frac{3}{9}$$

(c)  $\frac{8}{3} > \frac{8}{5} > \frac{8}{6} > \frac{8}{7} > \frac{8}{9}$  ( $\because 3 < 5 < 6 < 7 < 9$ )