

FRACTIONS

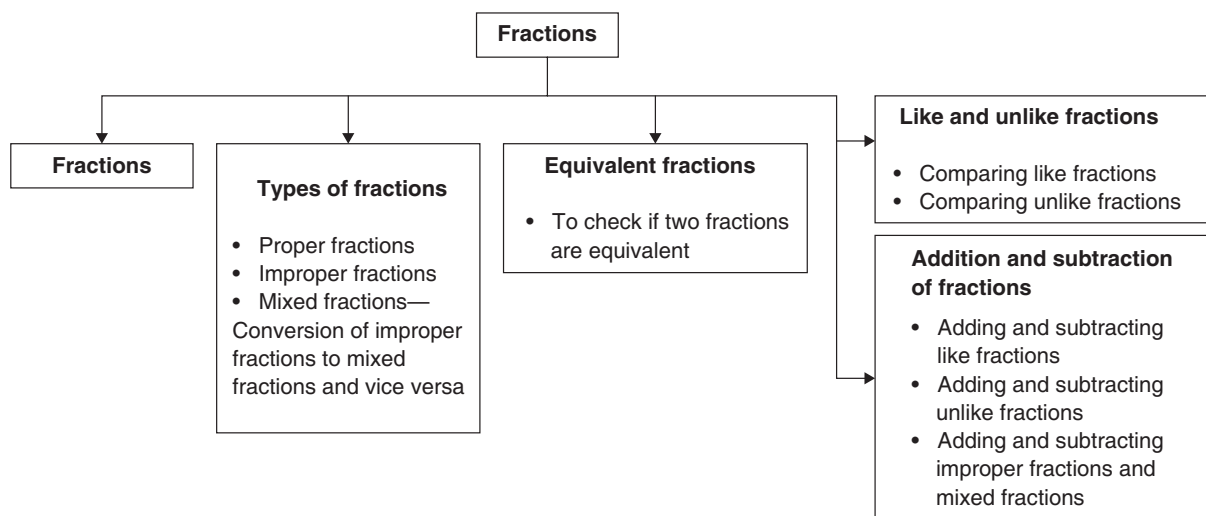
Learning objectives

Students will learn:

- To recognise a fraction as a part of a whole
- To differentiate between numerator and denominator
- To identify different kinds of fractions
- To identify a situation for a given type of fraction
- To compare fractions
- To add and subtract fractions

Prior knowledge

- Meaning of fraction, concept of numerator and denominator



Guidelines to teach

Warm Up:

- Use the paper folding activity in the Warm Up section in the course book to recapitulate that a fraction is a part of the whole. Use the same activity to explain that
 - a whole can be represented by different sets of fractions.
 - a fraction can be interpreted and represented in different ways.

Fractions:

- Use the course book to explain what a fraction describes. (*the parts of the whole that are being considered*)
- Review the terms numerator and denominator.
- Explain how fractions can show parts of a collection or a group.
- Instruct students to attempt the questions in the Quick Check section, to assess their understanding of the concept.

Types of fractions:

- Use the course book to explain what proper fractions and improper fractions are. Ask students to give a few examples of proper and improper fractions.
- Use the course book to explain what a mixed fraction is. Point out that the fractional part of a mixed number is always a proper fraction.
- Ask students to give a few examples of mixed fractions.

Conversion of improper fractions to mixed fractions:

- Explain the steps for converting improper fractions into mixed fractions, from the course book.
- Instruct students to study the solved examples in the Guided Learning section. (Students can arrive at the answers given by doing the actual division.)
- Give students a few improper fractions for converting into mixed fractions.

For example, $\frac{9}{4}, \frac{6}{5}, \frac{7}{3}$ ($2\frac{1}{4}, 1\frac{1}{5}, 2\frac{1}{3}$)

Conversion of mixed fractions to improper fractions:

- Explain the steps for converting mixed fractions into improper fractions, from the course book.
- Instruct students to look at the solved examples in the Guided Learning section.
- Give students a few mixed fractions for converting into improper fractions.

For example, $2\frac{1}{2}, 3\frac{3}{5}, 6\frac{1}{4}$ ($\frac{5}{2}, \frac{18}{5}, \frac{25}{4}$)

- Instruct students to attempt the Tryout and the exercise in the Quick Check section.

Equivalent fractions:

- Use the activity given in the course book to explain the concept of equivalent fractions.

1. Extension activity for equivalent fractions:

- Take three bowls/ boxes. Write the fraction $\frac{1}{2}$ on the first bowl/box, $\frac{1}{3}$ on the second bowl/ box and $\frac{1}{4}$ on the third bowl/box and place them on a table.
- Take slips of paper, the size of postcards. Write the fractions $\frac{2}{4}, \frac{4}{8}, \frac{9}{18}, \frac{2}{6}, \frac{3}{9}, \frac{4}{12}, \frac{2}{8}, \frac{3}{12}, \frac{4}{16}$ on these slips with a bold marker pen, one fraction per slip.
- Fold the slips, shuffle them well and place them on the table.
- Ask a student to volunteer for the activity. Instruct her/him to pick a slip and show the fraction written on it to the class.



- Ask students: What will you get if you reduce the fraction (on this slip) to its lowest terms?

$$\left(\frac{1}{2} / \frac{1}{3} / \frac{1}{4}\right).$$

- Now point to the bowls / boxes and ask students: Which of these bowls/ boxes should we put the slip into?
- After they answer, instruct the volunteer to drop the slip into that bowl. Then, make her/ him pick another slip and repeat the procedure.
- Ask the same question and elicit the answer.
- Repeat the process for all the fractions written on the slips.
- After the slips have been put in different bowls, remove all the slips from one bowl/ box and display them. Instruct students to read the fractions in them. Point out that they are all equivalent fractions of the fraction marked on that particular bowl/box. For example, the fractions $\frac{2}{4}, \frac{4}{8}, \frac{9}{18}$ that have gone into the ' $\frac{1}{2}$ ' bowl/box are the equivalent fractions of $\frac{1}{2}$.
- Repeat the process for the two remaining bowls.

(Note: If students do not answer correctly, point out the errors and let them try again.)

(You may conduct this as a group activity, where you divide the class into convenient groups and call each group to the table to do the activity.)

To check whether two fractions are equivalent:

- Explain the method of checking whether two fractions are equivalent or not from the course book.
- Ask students to study the solved examples in the Guided Learning section.
- Give them adequate practice to write equivalent fractions by multiplication and by division and to check if the given fractions are equivalent or not.
- Instruct students to attempt the Tryout and the exercise in the Quick Check section.

Like and unlike fractions:

- Use the course book to explain the difference between like and unlike fractions.

Comparing like fractions:

- Explain how like fractions can be compared. Instruct students to extend the idea (comparison of fractions) and arrange some like fractions in ascending and descending order.
- Instruct students to study the solved example in the Guided Learning section.

Comparing unlike fractions:

- Explain the steps for changing two or more unlike fractions to like fractions and comparing them.
- Tell students that we can compare only those fractions that have a common denominator, which is why we change unlike fractions to like fractions.
- Instruct students to study the solved example in the Guided Learning section for the ordering of unlike fractions.

Addition and subtraction of fractions:

Adding and subtracting like fractions:

- Explain how like fractions are added and subtracted with inputs from the course book. Use the solved example in the Guided Learning section to reinforce the concept.

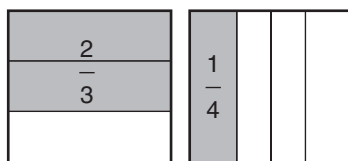
Adding and subtracting unlike fractions:

- Tell students that to add or subtract unlike fractions, it is first necessary to change them to like fractions.
- Ask students to recall the other instances where we need to change unlike fractions to like fractions. (*to compare them, to arrange them in ascending or descending order*)
- Explain the addition and subtraction of unlike fractions using the solved example in the Guided Learning section before attempting the Tryout.

2. Extension activity for addition of unlike fractions:



- To demonstrate the addition of $\frac{2}{3}$ and $\frac{1}{4}$:
- Take three square sheets of paper of size 12×12 sq. cm.

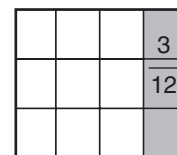
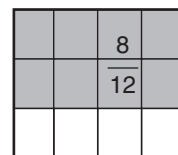


- Draw lines on or fold two sheets to represent the fractions $\frac{2}{3}$ and $\frac{1}{4}$.
- Ask students:
 - Are $\frac{2}{3}$ and $\frac{1}{4}$ like fractions or unlike fractions? (*Unlike fractions*)
 - How do we add unlike fractions? (*Find the LCM of their denominators, change them to like fractions and then add them*)
 - What is the LCM of 3 and 4? (*12*)

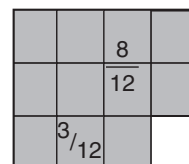
- Work out the equivalent fractions of $\frac{2}{3}$ and $\frac{1}{4}$:

$$\frac{2}{3} = \frac{2 \times 4}{3 \times 4} = \frac{8}{12}$$

$$\frac{1}{4} = \frac{1 \times 3}{4 \times 3} = \frac{3}{12}$$



- Turn the two sheets over and divide each of them into **12** equal parts.
- Shade the parts to represent $\frac{8}{12}$ and $\frac{3}{12}$ as shown.
- Cut out the shaded portion from both the sheets and ask students to say the fractions on the reverse. ($\frac{2}{3}$ and $\frac{1}{4}$)
- Place the cut out portions on the third sheet as shown.
- Ask students to count the number of shaded squares and tell you the fraction they represent. ($\frac{11}{12}$)
- Turn the two sheets over and ask students: What is $\frac{2}{3} + \frac{1}{4}$? ($\frac{11}{12}$)



Adding and subtracting improper fractions and mixed fractions:

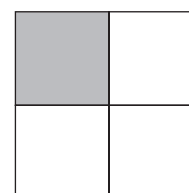
- Explain the two methods of adding and subtracting mixed fractions.
- Explain the addition and subtraction of mixed fractions using the solved examples in the Guided Learning section.
- Ask students to complete the Tryout for addition and subtraction of mixed fractions.

More suggestions for extension activities

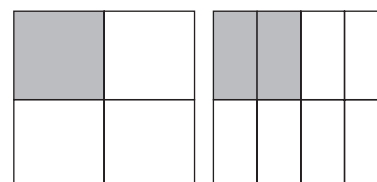


3. Activity (*Equivalent fractions*):

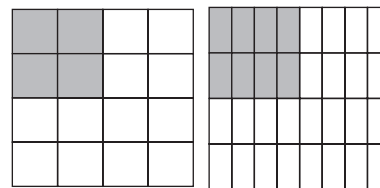
- Divide the class into convenient groups.
- Give each group 4 plain square sheets of size 12×12 sq. cm.
- On a sheet of paper of the same size, represent $\frac{1}{4}$.
- Show it to all the groups as sample.
- Tell them that they can draw lines or fold the paper to represent the fractions.
- Give them further instructions as follows:



- On the first sheet, represent the fraction $\frac{1}{4}$.
- On the second sheet, represent the fraction $\frac{2}{8}$.



- On the third sheet, represent the fraction $\frac{4}{16}$.
- On the fourth sheet, represent the fraction $\frac{8}{32}$.



- Check if the students have represented the fractions like this.
- Ask them to cut these fractions out and compare their sizes.
- Ask students: Are the portions cut out of the same size? (Yes.)
- What can you conclude about these fractions?
(They are equivalent fractions of $\frac{1}{4}$.)

4. Activity (*Improper fractions and mixed fractions*):

- Make the students sit in groups of 5 or 6. Give each group
 - five mixed fractions written on five slips of paper
 - five blank slips.
- Instruct the groups to convert the mixed fractions given to them into improper fractions and write them on the blank slips, one fraction per slip.
- Go to each group and check if their answers are correct. Else, point out the error and make the students correct them.
- After checking the fractions of all the groups, instruct the groups to fold all their slips and shuffle them.
- Instruct the first group to leave their slips behind and to go to the second group. There, ask them to match each mixed fraction to its improper fraction correctly. Let them show the pairs of correctly matched slips to the class.
- Ask the first group to return to its place on completing the task.
- Instruct the second group to go to the third group and repeat what the first group did. Give each group a chance to do the activity in the same manner. (The last group will go to the first group.)

Question Bank

1. CHOOSE THE CORRECT OPTION.

a. The improper form of the mixed fraction $13\frac{1}{5}$ is

- | | |
|---------------------|--------------------|
| i. $\frac{66}{5}$ | ii. $\frac{65}{5}$ |
| iii. $\frac{64}{5}$ | iv. $\frac{14}{5}$ |

b. Which is not an equivalent fraction of $\frac{2}{5}$?

- | | |
|----------------------|---------------------|
| i. $\frac{34}{85}$ | ii. $\frac{24}{60}$ |
| iii. $\frac{18}{45}$ | iv. $\frac{8}{40}$ |

c. Which is the largest among $\frac{7}{20}$, $\frac{7}{11}$, $\frac{7}{15}$ and $\frac{7}{18}$?

i. $\frac{7}{20}$

ii. $\frac{7}{11}$

iii. $\frac{7}{15}$

iv. $\frac{7}{18}$

d. What should be subtracted from $\frac{9}{11}$ to make it $\frac{7}{11}$?

i. $\frac{2}{11}$

ii. $\frac{3}{11}$

iii. $\frac{4}{11}$

iv. $\frac{5}{11}$

e. If there are 3 dozen oranges, 5 dozen bananas and 2 dozen mangoes in a basket, the fraction of bananas in the basket is

i. $\frac{1}{5}$

ii. $\frac{5}{12}$

iii. $\frac{3}{10}$

iv. $\frac{1}{2}$

2. FILL IN WITH BOXES WITH THE >, < OR =.

a. $\frac{2}{9}$ $\frac{7}{9}$

b. $\frac{12}{17}$ $\frac{12}{19}$

c. $\frac{11}{20}$ $\frac{13}{20}$

d. $\frac{7}{8}$ $\frac{7}{11}$

e. $\frac{2}{5}$ $\frac{10}{25}$

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

3. COMPARE THE FRACTIONS GIVEN BELOW:

a. $\frac{7}{9}$ and $\frac{10}{11}$

b. $\frac{5}{6}$ and $\frac{6}{7}$

c. $\frac{4}{9}$ and $\frac{5}{8}$

d. $\frac{11}{12}$ and $\frac{13}{14}$

e. $\frac{6}{15}$ and $\frac{9}{17}$

4. ARRANGE IN ASCENDING ORDER.

a. $\frac{1}{2}$, $\frac{1}{4}$, $\frac{5}{8}$, $\frac{3}{4}$

b. $\frac{2}{5}$, $\frac{5}{10}$, $\frac{7}{15}$, $\frac{12}{20}$

c. $\frac{2}{3}$, $\frac{3}{12}$, $\frac{5}{9}$, $\frac{4}{18}$ d. $\frac{3}{4}$, $\frac{7}{8}$, $\frac{5}{16}$, $\frac{7}{4}$

5. ARRANGE IN DESCENDING ORDER.

a. $\frac{1}{8}$, $\frac{5}{16}$, $\frac{7}{4}$, $\frac{9}{8}$

b. $\frac{6}{15}$, $\frac{5}{9}$, $\frac{3}{5}$ and $\frac{2}{10}$

c. $\frac{3}{6}$, $\frac{5}{3}$, $\frac{7}{9}$, $\frac{4}{3}$

d. $\frac{1}{7}$, $\frac{5}{14}$, $\frac{3}{14}$, $\frac{7}{21}$

6. ANSWER THE FOLLOWING:

a. What is $\frac{48}{60}$ in the simplest form?

b. Express the following as mixed number:

i. $\frac{64}{5}$

ii. $\frac{86}{9}$

c. Express the following as improper fraction:

i. $7\frac{5}{8}$

ii. $12\frac{5}{10}$

d. Are $\frac{12}{20}$ and $\frac{30}{125}$ equivalent?

e. Write 5 equivalent fractions of $\frac{12}{15}$.

f. Solve the following:

i. $\frac{1}{3} + \frac{2}{5} - \frac{7}{15}$ ii. $\frac{5}{14} + \frac{3}{7} + \frac{9}{14}$

iii. $2\frac{1}{7} + 4\frac{1}{14}$ iv. $3\frac{1}{8} + 2\frac{3}{16}$

g. What fraction of a day is 6 hours?

h. Rahul takes $\frac{11}{5}$ minutes to walk to school from his house while his sister Ria takes $4\frac{2}{5}$ minutes to walk to school. Who takes less time and by how much?

- i. Sam reads 30 pages of a book with 120 pages in a day and Tapsee reads $\frac{1}{6}$ of the book in a day. Whose reading speed is more?

- j. Ria gets to eat $\frac{2}{7}$ of a cake while Rahat gets to eat $\frac{3}{5}$ of the same cake. Who gets the smaller portion?

Answer Key to the Question Bank

1. a. i b. iv c. ii d. i e. iv 2. a. < b. > c. < d. > e. = f. <

3. a. < b. < c. < d. < e. <

4. a. $\frac{1}{4}, \frac{1}{2}, \frac{5}{8}, \frac{3}{4}$ b. $\frac{2}{5}, \frac{7}{15}, \frac{5}{10}, \frac{12}{20}$ c. $\frac{4}{18}, \frac{3}{12}, \frac{5}{9}, \frac{2}{3}$ d. $\frac{5}{16}, \frac{3}{4}, \frac{7}{8}, \frac{7}{4}$

5. a. $\frac{7}{4}, \frac{9}{8}, \frac{5}{16}, \frac{1}{8}$ b. $\frac{3}{5}, \frac{5}{9}, \frac{6}{15}, \frac{2}{10}$ c. $\frac{5}{3}, \frac{4}{3}, \frac{7}{9}, \frac{3}{6}$ d. $\frac{5}{14}, \frac{7}{21}, \frac{3}{14}, \frac{1}{7}$

6. a. $\frac{4}{5}$ b. i. $12\frac{4}{5}$ ii. $9\frac{5}{9}$ c. i. $\frac{61}{8}$ ii. $\frac{125}{10}$ d. no e. Answers will vary.

f. i. $\frac{4}{15}$ ii. $\frac{20}{14}$ or $\frac{10}{7}$ iii. $6\frac{3}{14}$ iv. $5\frac{5}{16}$ g. $\frac{1}{4}$ h. Rahul, $\frac{11}{5}$ minutes

i. Sam's j. Ria

Answer key to the worksheet

A. 1. c 2. b 3. d 4. c 5. d B. 1. yes, equal parts 2. no, unequal parts

C 1. mixed = $1\frac{3}{7}$; improper = $\frac{7}{7} + \frac{3}{7} = \frac{10}{7}$ 2. mixed = $4\frac{9}{10}$; improper = $\frac{40}{10} + \frac{9}{10} = \frac{49}{10}$

D. 1. not equivalent 2. equivalent

E. 1. $\frac{17}{17} = 1$ 2. $\frac{3}{9} = \frac{1}{3}$ 3. $\frac{41}{21}$



A. Choose the correct answer.

- The mixed fraction $5\frac{3}{8}$ can be written as:
 - $5 \times \frac{3}{8}$
 - $5 - \frac{3}{8}$
 - $5 + \frac{3}{8}$
 - $5 \div \frac{3}{8}$
- The equivalent fraction for $\frac{1}{5}$ is:
 - $\frac{3}{5}$
 - $\frac{2}{10}$
 - $\frac{1}{10}$
 - $\frac{10}{2}$
- To reduce a fraction to the lowest term, divide it by:
 - the LCM of the numerator and denominator
 - only one of the common factors of the numerator and the denominator
 - one of the common multiples of the numerator and the denominator
 - the HCF of the numerator and denominator
- If $\frac{p}{q} = \frac{r}{s}$ (equivalent fractions), then:
 - $pr = qs$
 - $pq = rs$
 - $ps = qr$
 - $p = r$
- The value of an improper fraction is:
 - less than 1
 - less than $\frac{1}{2}$
 - less than $\frac{1}{4}$
 - greater than 1

B. Check if you can represent the shaded parts as a fraction. Give reasons for your answer.



C. Represent the shaded parts as mixed and improper fractions of the total parts.



D. Check if the given fractions are equivalent or not.

- $\frac{7}{8}$ and $\frac{9}{10}$
- $\frac{3}{5}$ and $\frac{9}{15}$

E. Simplify.

- $\frac{12}{17} + \frac{5}{17}$
- $\frac{4}{9} - \frac{1}{9}$
- $\frac{5}{3} + \frac{2}{7}$