

# NCERT Class 7 Maths Chapter 8 Working with Fractions Solutions Question Answer

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## 8.1 Multiplication of Fractions

### Figure It Out (Pages 176 – 177)

#### Question 1.

**Tenzin drinks  $\frac{1}{2}$  glass of milk every day. How many glasses of milk does he drink in a week? How many glasses of milk did he drink in January?**

Solution:

Given: Tenzin drinks  $\frac{1}{2}$  glass of milk every day  
and we know that 1 week = 7 days.

$\therefore$  No. of glasses of milk = No. of days  $\times$  Quantity of milk taken in 1 day.

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

$$= 3 \frac{1}{2} \text{ glasses}$$

Hence Tenzin drinks  $3 \frac{1}{2}$  glasses of milk in a week.

January has 31 days.

Each day he drinks  $\frac{1}{2}$  glass.

No. of glasses of milk in January =  $\frac{1}{2} \times 31 = 15 \frac{1}{2}$  glasses.

#### Question 2.

**A team of workers can make 1 km of a water canal in 8 days. So, in one day, the team can make \_\_\_ km of the water canal. If they work 5 days a week, they can make \_\_\_ km of the water canal in a week.**

Solution:

Given: A team of workers can make 1 km of a water canal in 8 days.

$\therefore$  In one day the team can make =  $\frac{1}{8}$  km of the water canal.

If they work 5 days a week, they can make =  $\frac{1}{8} \times 5 = \frac{5}{8}$  km

#### Question 3.

**Manju and two of her neighbors buy 5 liters of oil every week and share it equally among the three families. How much oil does each family get in a week? How much oil will one family get in 4 weeks?**

Solution:

Here amount of oil each family gets in a week =  $\frac{5}{3}$  litres

$\therefore$  Amount of oil one family gets in 4 weeks =  $4 \times \frac{5}{3}$

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

$$= 6 \frac{2}{3} \text{ litres}$$

**Question 4.**

Sofia saw the Moon setting on Monday at 10 pm. Her mother, who is a scientist, told her that every day the Moon sets  $\frac{5}{6}$  hour later than the previous day. How many hours after 10 pm will the moon set on Thursday?

Solution:

On Monday, the Moon set at 10 PM

Each day, the Moon sets  $\frac{5}{6}$  hours later than the previous day.

Now, let's calculate the time delay for Thursday:

1. Tuesday:  $(10 + \frac{5}{6})$  hours
2. Wednesday:  $(10 + \frac{5}{6} + \frac{5}{6})$  hours
3. Thursday:  $(10 + \frac{10}{6} + \frac{5}{6})$  hours

Now, simplifying:

Thursday:  $(10 + \frac{5}{6}) = 12 : 30$  AM (which is 12 hours 30 minutes after 10 PM on Monday)

So, on Thursday, the Moon will set 2 hours and 30 minutes after 10 PM, meaning it will set at 12 : 30 AM.

**Question 5.**

**Multiply and then convert it into a mixed fraction:**

- (a)  $7 \times \frac{3}{5}$
- (b)  $4 \times \frac{1}{3}$
- (c)  $\frac{9}{7} \times 6$
- (d)  $\frac{13}{11} \times 6$

**So far, we have learnt multiplication of a whole number with a fraction, and a fraction with a whole number. What happens when both numbers in the multiplication are fractions?**

Solution:

(a)  $7 \times \frac{3}{5}$

We have,  $7 \times \frac{3}{5} = \frac{21}{5} = 4\frac{1}{5}$

(b) Here,

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

(c) Here, [LearnInsta.com](https://www.learninsta.com)

$$\frac{9}{7} \times 6 = \frac{54}{7} = 7\frac{5}{7}$$

(d) Here,

$$\frac{13}{11} \times 6 = \frac{78}{11} = 7\frac{1}{11}$$

### Figure It Out (Pages 180 – 181)

#### Question 1.

Find the following products. Use a unit square as a whole for representing the fractions:

(a)  $\frac{1}{3} \times \frac{1}{5}$

(b)  $\frac{1}{4} \times \frac{1}{3}$

(c)  $\frac{1}{5} \times \frac{1}{2}$

(d)  $\frac{1}{6} \times \frac{1}{5}$

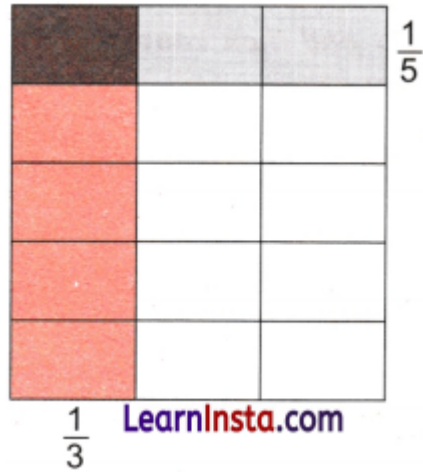
Now, find  $\frac{1}{12} \times \frac{1}{18}$ .

Solution:

(a) Here, the unit square is divided into 5 rows and 3 columns, creating  $5 \times 3 = 15$  equal parts.

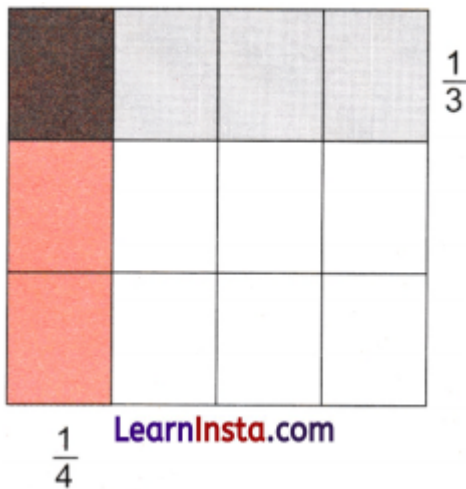
One of the parts is double-shaded.

Hence  $\frac{1}{3} \times \frac{1}{5} = \frac{1}{15}$



(b) Here, the unit square is divided into 3 rows and 4 columns, creating  $3 \times 4 = 12$  equal parts.

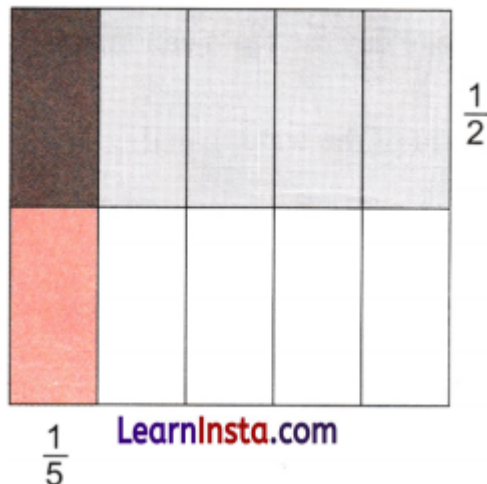
One of the parts is double-shaded. Hence  $1/4 \times 1/3 = 1/12$



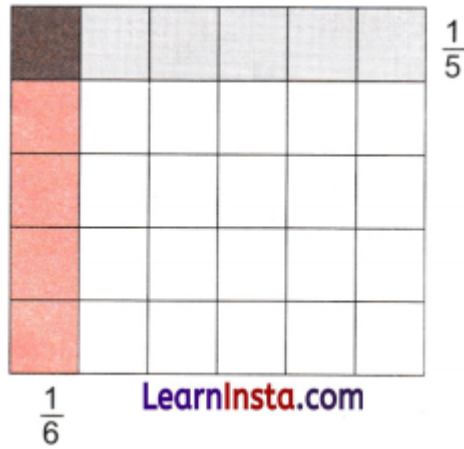
(c) Here, the unit square is divided into 2 rows and 5 columns, creating  $5 \times 2 = 10$  equal parts.

One of the parts is double-shaded.

Hence  $1/5 \times 1/2 = 1/10$



(d) Here unit square is divided into 5 rows and 6 columns.  
 Equal parts =  $5 \times 6 = 30$   
 One of the parts is double-shaded.  
 Hence  $1/6 \times 1/5 = 1/30$



Now  $1/12 \times 1/18 = 1/216$

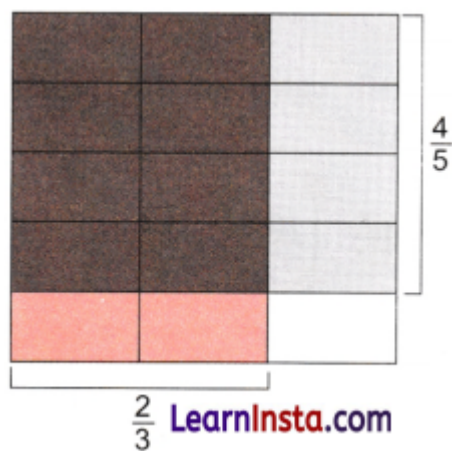
**Question 2.**

Find the following products. Use a unit square as a whole for representing the fractions and carrying out the operations.

- (a)  $2/3 \times 4/5$
- (b)  $1/4 \times 2/3$
- (c)  $3/5 \times 1/2$
- (d)  $4/6 \times 3/5$

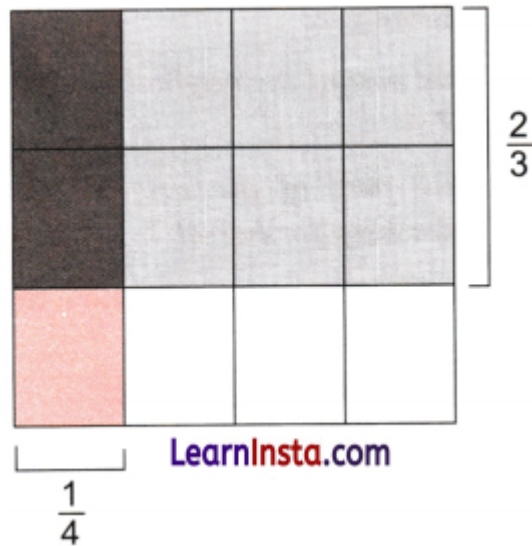
Solution:

(a) Here unit square is divided into 5 rows and 3 columns.



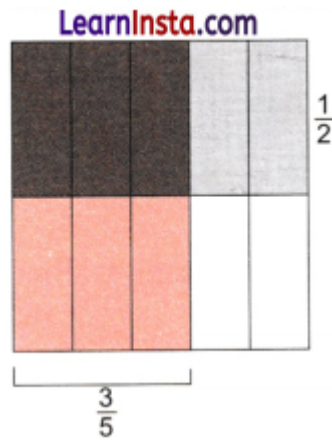
Equal parts =  $5 \times 3 = 15$  and  $2 \times 4 = 8$  of the parts are double shaded.  
 Thus  $8/15$  of the whole is double shaded.  
 Hence  $2/3 \times 4/5 = 8/15$

(b) Here unit square is divided into 3 rows and 4 columns.



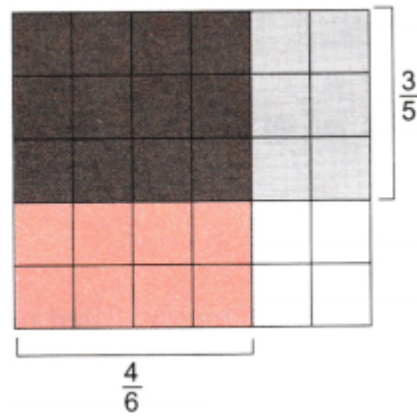
Equal parts =  $3 \times 4 = 12$  and  $1 \times 2 = 2$  of the parts are double shaded.  
Thus  $2/12 = 1/6$  of the whole is double shaded.  
Hence  $1/4 \times 2/3 = 2/12 = 1/6$

(c) Here unit square is divided into 2 rows and 5 columns.



Equal parts =  $2 \times 5 = 10$  and  $1 \times 3 = 3$  of the parts are double shaded.  
Thus  $3/10$  of the whole is double shaded.  
Hence  $2/5 \times 1/2 = 1/5$

(d) Here unit square is divided into 5 rows and 6 columns.



Equal parts =  $5 \times 6 = 30$  and  $4 \times 3 = 12$  of the parts are double shaded.

Thus  $12/30$  of the whole is double shaded.

Hence  $4/6 \times 3/5 = 12/30 = 6/15$

### Figure It Out (Pages 183 – 184)

#### Question 1.

A water tank is filled from a tap. If the tap is open for 1 hour,  $7/10$  of the tank gets filled. How much of the tank is filled if the tap is open for

(a)  $1/3$  hour \_\_\_\_\_

(b)  $2/3$  hour \_\_\_\_\_

(c)  $3/4$  hour \_\_\_\_\_

(d)  $7/10$  hour \_\_\_\_\_

(e) For the tank to be full, how long should the tap be running?

Solution:

(a)  $1/3$  hour \_\_\_\_\_

In 1 hour =  $\frac{7}{10}$  tank is filled

$$\text{In } \frac{1}{3} \text{ hour} = \frac{7}{10} \times \frac{1}{3} = \frac{7}{30}$$

Hence,  $\frac{7}{30}$  of the tank is filled in  $\frac{1}{3}$  hour.

(b)  $\frac{2}{3}$  hour \_\_\_\_\_ [LearnInsta.com](https://www.learninsta.com)

We know that in 1 hour, the tap fills  $\frac{7}{10}$  of the tank.

$$\text{In } \frac{2}{3} \text{ hour} = \frac{7}{10} \times \frac{2}{3}$$

$$= \frac{7}{\cancel{10}^5} \times \frac{\cancel{2}^1}{3} = \frac{7}{15}$$

Hence  $\frac{7}{15}$  of the tank is filled in  $\frac{2}{3}$  hour.

(c)  $\frac{3}{4}$  hour \_\_\_\_\_

In 1 hour, the tap fills =  $\frac{7}{10}$

$$\text{In } \frac{3}{4} \text{ hour} = \frac{7}{10} \times \frac{3}{4} = \frac{21}{40}$$

Hence,  $\frac{21}{40}$  of the tank is filled in  $\frac{3}{4}$  hour.

(d)  $\frac{7}{10}$  hour \_\_\_\_\_

In 1 hour, the tap fills =  $\frac{7}{10}$

in  $\frac{7}{10}$  hour =  $\frac{7}{10} \times \frac{7}{10} = \frac{49}{100}$

Hence,  $\frac{49}{100}$  of the tank is filled in  $\frac{7}{10}$  hour.

(e) The time to fill the tank = ?

in 1 hour, the tap fills =  $\frac{7}{10}$  tank.

To find how long it takes to fill 1 full tank.

We need to divide 1 by  $\frac{7}{10}$ .

Time =  $\frac{1}{\frac{7}{10}} = \frac{10}{7}$  hours.

=  $1\frac{3}{7}$  hours

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The tap will fill the tank in  $1\frac{3}{7}$  hours.

### Question 2.

The government has taken  $\frac{1}{6}$  of Somu's land to build a road. What part of the land remains with Somu now? She gives half of the remaining part of the land to her daughter Krishna and  $\frac{1}{3}$  of it to her son Bora. After giving them their shares, she kept the remaining land for herself.

(a) What part of the original land did Krishna get?

(b) What part of the original land did Bora get?

(c) What part of the original land did Somu keep for herself?

Solution:

Land remaining with Somu after the govt takes  $\frac{1}{6} = 1 - \frac{1}{6} = \frac{5}{6}$

Somu now has  $\frac{5}{6}$  of the original land.

(a) Krishna gets half of the remaining land  $\frac{5}{6} = \frac{1}{2} \times \frac{5}{6} = \frac{5}{12}$

Hence, Krishna gets  $\frac{5}{12}$  of the original land.

(b) Bora gets  $\frac{1}{3}$  of the remaining land =  $\frac{1}{3} \times \frac{5}{6} = \frac{5}{18}$

Hence, Bora gets  $\frac{5}{18}$  of the original land.

(c) Total share of government, Krishna, and Bora form the original land =

$\frac{1}{6} + \frac{5}{12} + \frac{5}{18} = \frac{31}{36}$

∴ Part of land left with Somu =  $1 - 31/36 = 5/36$

### Question 3.

Find the area of a rectangle of sides  $3 \frac{3}{4}$  ft and  $9 \frac{3}{5}$  ft.

Solution:

Given: length of rectangle =  $3 \frac{3}{4}$  ft =  $\frac{15}{4}$  ft

and width of rectangle =  $9 \frac{3}{5}$  ft =  $\frac{48}{5}$  ft

Now the area of the rectangle = length  $\times$  width

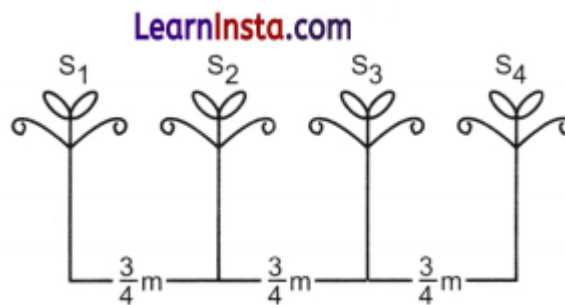
=  $\frac{15}{4} \times \frac{48}{5}$  ft<sup>2</sup> = 36 sq. ft.

### Question 4.

Tsewang plants four saplings in a row in his garden. The distance between two saplings is  $\frac{3}{4}$  m. Find the distance between the first and last sapling.

[Hint: Draw a rough diagram with four saplings with distance between two saplings as  $\frac{3}{4}$  m]

Solution:



From the figure, we can see, there are three gaps of  $\frac{3}{4}$  m each between the four saplings.

Distance between the first and last sapling = Number of gaps  $\times$  Distance between two gaps

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

=  $\frac{9}{4}$  m

=  $2 \frac{1}{4}$  m

Hence, the distance between the first and last saplings is  $\frac{9}{4}$  metres, or  $2 \frac{1}{4}$  m.

### Question 5.

Which is heavier:  $\frac{12}{15}$  of 500 grams or  $\frac{3}{20}$  of 4 kg?

Solution:

$\frac{12}{15}$  of 500 gram =  $\frac{12}{15} \times 500$  g = 400 grams

We know, 4 kg = 4000 gms

$\frac{3}{20}$  of 4 kg =  $\frac{3}{20} \times 4000$  g = 600 gms

Now, 400 gms < 600 gms

Therefore, find quantity which is  $\frac{3}{20}$  of 4 kg is heavier.

8.2 Division of Fractions, 8.3 Some Problems Involving Fractions

**Figure It Out (Pages 196 – 198)**

**Question 1.**

Evaluate the following:

$3 \div \frac{7}{9}$	$\frac{14}{4} \div 2$	$\frac{2}{3} \div \frac{2}{3}$	$\frac{14}{6} \div \frac{7}{3}$
$\frac{4}{3} \div \frac{3}{4}$	$\frac{7}{4} \div \frac{1}{7}$	$\frac{8}{2} \div \frac{4}{15}$	LearnInsta.com
$\frac{1}{5} \div \frac{1}{9}$	$\frac{1}{6} \div \frac{11}{12}$	$3\frac{2}{3} \div 1\frac{3}{8}$	

Solution:

$$(a) 3 \div \frac{7}{9}$$

$$3 \div \frac{7}{9} \left( \text{Reciprocal of } \frac{7}{9} \text{ is } \frac{9}{7} \right)$$

$$= 3 \times \frac{9}{7} = \frac{27}{7} = 3\frac{6}{7}$$

$$(b) \frac{14}{4} \div 2$$

$$\frac{14}{4} \div 2 \left( \text{Reciprocal of } 2 \text{ is } \frac{1}{2} \right)$$

$$= \frac{14}{4} \times \frac{1}{2}$$

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

$$(c) \frac{2}{3} \div \frac{2}{3} \quad \text{LearnInsta.com}$$

$$\frac{2}{3} \div \frac{2}{3} \left( \text{Reciprocal of } \frac{2}{3} \text{ is } \frac{3}{2} \right)$$

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

$$= 1$$

$$(d) \frac{14}{6} \div \frac{7}{3}$$

$$\frac{14}{6} \div \frac{7}{3} \left( \text{Reciprocal of } \frac{7}{3} \text{ is } \frac{3}{7} \right)$$

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

$$= 1$$

$$(e) \frac{4}{3} \div \frac{3}{4}$$

$$\frac{4}{3} \div \frac{3}{4} \left( \text{Reciprocal of } \frac{3}{4} \text{ is } \frac{4}{3} \right)$$

$$= \frac{4}{3} \times \frac{4}{3} = \frac{16}{9} = 1\frac{7}{9}$$

$$(f) \frac{7}{4} \div \frac{1}{7} \quad \text{LearnInsta.com}$$

$$\frac{7}{4} \div \frac{1}{7} \left( \text{Reciprocal of } \frac{1}{7} \text{ is } 7 \right)$$

$$= \frac{7}{4} \times 7 = \frac{49}{4} = 12\frac{1}{4}$$

$$(g) \frac{8}{2} \div \frac{4}{15}$$

$$\frac{8}{2} \div \frac{4}{15} \left( \text{Reciprocal of } \frac{4}{15} \text{ is } \frac{15}{4} \right)$$

$$= \frac{8}{2} \times \frac{15}{4} = 15$$

$$(h) \frac{1}{5} \div \frac{1}{9}$$

$$\frac{1}{5} \div \frac{1}{9} \left( \text{Reciprocal of } \frac{1}{9} \text{ is } 9 \right)$$

$$= \frac{1}{5} \times 9 = \frac{9}{5} = 1\frac{4}{5}$$

$$(i) \frac{1}{6} \div \frac{11}{12} \quad \text{LearnInsta.com}$$

$$\frac{1}{6} \div \frac{11}{12} \left( \text{Reciprocal of } \frac{11}{12} \text{ is } \frac{12}{11} \right)$$

$$= \frac{1}{6} \times \frac{12}{11} = \frac{2}{11}$$

$$(j) 3\frac{2}{3} \div 1\frac{3}{8}$$

$$3\frac{2}{3} \div 1\frac{3}{8}$$

We know that,

$$3\frac{2}{3} = \frac{11}{3} \quad \text{and} \quad 1\frac{3}{8} = \frac{11}{8}$$

$$\begin{aligned} \text{So, } \frac{11}{3} \div \frac{11}{8} & \text{ (Reciprocal of } \frac{11}{8} \text{ is } \frac{8}{11} \text{)} \\ & \text{LearnInsta.com} \\ & = \frac{11}{3} \times \frac{8}{11} = \frac{8}{3} = 2\frac{2}{3} \end{aligned}$$

### Question 2.

For each of the questions below, choose the expression that describes the solution. Then simplify it.

(a) Maria bought 8 m of lace to decorate the bags she made for school. She used  $\frac{1}{4}$  for each bag and finished the lace. How many bags did she decorate?

- (i)  $8 \times \frac{1}{4}$
- (ii)  $\frac{1}{8} \times \frac{1}{4}$
- (iii)  $8 \div \frac{1}{4}$
- (iv)  $\frac{1}{4} \div 8$

Solution:

(iii) Maria had a total lace = 8 m

She used lace for each bag =  $\frac{1}{4}$  m

Number of bags = Total lace length / Length of lace per bag =  $8 \div \frac{1}{4}$

Hence, option (iii) is the correct expression to describe the

solution.

$$= 8 \div \frac{1}{4} \text{ (Reciprocal of } \frac{1}{4} \text{ is } 4) = 8 \times 4 = 32$$

Therefore, Maria decorated 32 bags.

(b)  $\frac{1}{2}$  meter of ribbon is used to make 8 badges. What is the length of the ribbon used for each badge?

- (i)  $8 \times \frac{1}{2}$
- (ii)  $\frac{1}{2} \div \frac{1}{8}$
- (iii)  $8 \div \frac{1}{2}$
- (iv)  $\frac{1}{2} \div 8$

Solution:

(iv) Ribbon used to make badges =  $\frac{1}{2}$  m

No. of badges = 8

To find the length of the ribbon, we need to divide the total length of the ribbon by the number of badges.

Length of ribbon = Total length of ribbon / Number of badges =  $1/2 \div 8$

Hence, the correct option is (iv) for the expression to describe the solution.

$1/2 \div 8$  (Reciprocal of 8 is  $1/8$ )

=  $12 \times 1/8$

=  $1/16$  m

So, the length of the ribbon used for each badge is  $1/16$ .

**(c) A baker needs  $1/6$  kg of flour to make one loaf of bread. He has 5 kg of flour. How many loaves of bread can he make?**

(i)  $5 \times 1/6$

(ii)  $1/6 \div 5$

(iii)  $5 \div 1/6$

(iv)  $5 \times 6$

Solution:

(iii) Flour needed for a loaf =  $1/6$  kg

Total flour = 5 kg

To find how many loaves he can make, we need to divide the total amount of flour by the amount of flour needed for one loaf.

No. of loaves = Total flour / Flour per loaf =  $5 \div 1/6$

Hence, the correct option is

(iii) for the expression to describe the solution.

$5 \div 1/6$  (Reciprocal of  $1/6$  is 6) =  $5 \times 6 = 30$  loaves

Hence, the baker can make 30 loaves of bread with 5 kg of flour.

**Question 3.**

**If  $1/4$  kg of flour is used to make 12 rods, how much flour is used to make 6 rods?**

Solution:

Given  $1/4$  kg of flour = 12 rotis

To find the amount of flour used for 1 roti, we need to divide the amount of flour used by to total no. of rotis.

Then,  $1/4 \div 12$  (Reciprocal of 12 is  $1/12$ )

=  $1/4 \times 1/12$

=  $1/48$  kg for 1 Roti

Flour used to make 6 roti =  $1/48 \times 6 = 1/8$  kg

**Question 4.**

**Patiganita, a book written by Sridharacharya in the 9th century CE, mentions this problem: "Friend, after thinking, what sum will be obtained by adding together  $1 \div 1/6$ ,**

**$1 \div 1/10$ ,  $1 \div 1/13$ ,  $1 \div 1/9$ , and  $1 \div 1/2$ ". What should the friend say?**

Solution:

The sum of  $1 \div \frac{1}{6} + 1 \div \frac{1}{10} + 1 \div \frac{1}{13} + 1 \div \frac{1}{9} + 1 \div \frac{1}{2}$

(Reciprocal of  $\frac{1}{6}$  is 6,  $\frac{1}{10}$  is 10,  $\frac{1}{13}$  is 13,  $\frac{1}{9}$  is 9 and  $\frac{1}{2}$  is 2) Then,  $1 \times 6 + 1 \times 10 + 1 \times 13 + 1 \times 9 + 1 \times 2 = 6 + 10 + 13 + 9 + 2 = 40$

The friend should say the sum is 40.

### Question 5.

**Mira is reading a novel that has 400 pages. She read  $\frac{1}{5}$  of the pages yesterday and  $\frac{3}{10}$  of the pages today. How many more pages does she need to read to finish the novel?**

Solution: Total no. of pages in novel = 400

She read yesterday = 80 pages

She read today = 120 pages

Total no. of pages she read = yesterday + today

= (80 + 120) pages

= 200 pages

Pages left to read = Total no. of pages – Total no. of pages she read

= 400 – 200 pages

= 200 pages

Mira needs to read 200 more pages to finish the novel.

### Question 6.

**A car runs 16 km using 1 litre of petrol. How far will it go using  $2 \frac{3}{4}$  litres of petrol?**

Solution:

A car runs on 1 litre of petrol = 16 km

Then using  $2 \frac{3}{4}$  litres

=  $16 \times 2 \frac{3}{4}$

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

=  $4 \times 11$

= 44

The car will go 44 km using  $2 \frac{3}{4}$  litres of petrol.

### Question 7.

**Amritpal decides on a destination for his vacation. If he takes a train, it will take him  $5 \frac{1}{6}$  hours to get there. If he takes a plane, it will take him  $\frac{1}{2}$  hour. How many hours does the plane save?**

Solution:

Time taken by train =  $2 \frac{1}{6}$  hours =  $\frac{31}{6}$  hours

Air plane takes =  $\frac{1}{2}$  hour

Time saved by airplane = Train time – Plane time

$$= 3\frac{1}{6} - \frac{1}{2} \text{ [LCM of 6 and 2 is 6]}$$

$$= \frac{28}{6}$$

$$= \frac{14}{3}$$

$$= 4\frac{2}{3} \text{ hours}$$

**Question 8.**

**Mariam's grandmother baked a cake. Mariam and her cousins finished  $\frac{4}{5}$  of the cake. The remaining cake was shared equally by Mariam's three friends. How much of the cake did each friend get?**

Solution:

Mariam and her cousin finished the cake =  $\frac{4}{5}$  part

Remaining part of the cake =  $1 - \frac{4}{5} = \frac{1}{5}$

The remaining  $\frac{1}{5}$  of the cake was shared equally by 3 friends.

So each friend got =  $\frac{1}{5} \div 3$  (Reciprocal of 3 is  $\frac{1}{3}$ )

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

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

Each friend got  $\frac{1}{15}$  of the cake.

**Question 9.**

**Choose the option(s) describing the product of  $(\frac{565}{465} \times \frac{707}{676})$ :**

(a)  $> \frac{565}{465}$

(b)  $< \frac{565}{465}$  (c)  $> \frac{707}{676}$

(d)  $< \frac{707}{676}$  (e)  $> 1$

(f)  $< 1$

Solution:

Let's solve this problem without computing

By analyzing the expression  $(\frac{565}{465} \times \frac{707}{676})$

$(\frac{565}{465} \times \frac{707}{676}) \rightarrow$  Numerator is greater than Denominator  $\rightarrow$  This fraction is greater than 1.

$\frac{707}{676} \rightarrow$  Numerator is greater than Denominator  $\rightarrow$  This fraction is greater than 1.

It means, the product of two numbers greater than 1 is greater than each of them individually and greater than 1.

So, we conclude:

The product is greater than 1  $\rightarrow$  option (e)

The product is greater than  $\frac{565}{465} \rightarrow$  option (a)

The product is greater than  $\frac{707}{676} \rightarrow$  option (c)

Therefore, the correct answers are (a), (c), and (e)

**Question 10.**

**What fraction of the whole square is shaded?**



Solution:

Here right square is  $\frac{1}{4}$  of the whole square.

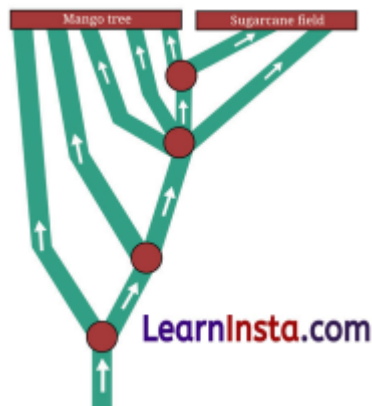
The yellow triangle inside it is  $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$

The shaded part is  $\frac{3}{4} \times \frac{1}{8} = \frac{3}{32}$

Hence, the shaded region is  $\frac{3}{32}$  of the whole.

### Question 11.

A colony of ants set out in search of food. As they search, they keep splitting equally at each point (as shown in the Figure) and reach two food sources, one near a mango tree and another near a sugarcane field. What fraction of the original group reached each food source?



Solution:

In the picture, 7 roads end at food sources.

5 roads go to the mango tree

2 roads go to the sugarcane tree

At each red dot, the ants divided in half.

Each group that reaches the food source =  $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{16}$

So, Mango tree:

5 roads  $\times \frac{1}{16} = \frac{5}{16}$  of the ants.

Sugarcane field:

2 roads  $\times \frac{1}{16} = \frac{2}{16} = \frac{1}{8}$  of the ants.

So,  $\frac{5}{16}$  ants reached the mango tree and  $\frac{1}{8}$  ants reached the sugarcane field.

### Question 12.

What is  $1 - 12$ ?

$$\left(1 - \frac{1}{2}\right) \times \left(1 - \frac{1}{3}\right)?$$

$$\left(1 - \frac{1}{2}\right) \times \left(1 - \frac{1}{3}\right) \times \left(1 - \frac{1}{4}\right) \times \left(1 - \frac{1}{5}\right)? \text{ LearnInsta.com}$$

$$\left(1 - \frac{1}{2}\right) \times \left(1 - \frac{1}{3}\right) \times \left(1 - \frac{1}{4}\right) \times \left(1 - \frac{1}{5}\right) \times \left(1 - \frac{1}{6}\right) \times \left(1 - \frac{1}{7}\right) \times \left(1 - \frac{1}{8}\right) \times \left(1 - \frac{1}{9}\right) \times \left(1 - \frac{1}{10}\right)?$$

Make a general statement and explain.

Solution:

Let us solve

$$\Rightarrow 1 - \frac{1}{2} + \frac{1}{2} \text{ LearnInsta.com}$$

$$\Rightarrow \left(1 - \frac{1}{2}\right) \times \left(1 - \frac{1}{3}\right) = \frac{1}{2} \times \frac{2}{3} = \frac{1}{3}$$

$$\begin{aligned} \Rightarrow & \left(1 - \frac{1}{2}\right) \times \left(1 - \frac{1}{3}\right) \times \left(1 - \frac{1}{4}\right) \times \left(1 - \frac{1}{5}\right) \\ & = \frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} = \frac{1}{5} \text{ LearnInsta.com} \end{aligned}$$

$$\begin{aligned} \Rightarrow & \left(1 - \frac{1}{2}\right) \times \left(1 - \frac{1}{3}\right) \times \left(1 - \frac{1}{4}\right) \times \left(1 - \frac{1}{5}\right) \times \left(1 - \frac{1}{6}\right) \\ & \times \left(1 - \frac{1}{7}\right) \times \left(1 - \frac{1}{8}\right) \times \left(1 - \frac{1}{9}\right) \times \left(1 - \frac{1}{10}\right) = \frac{1}{10} \end{aligned}$$

Explanation: Each term simplifies to a fraction whose numerator cancels with the denominator of the previous term, leaving only  $1/n$ .

In general

$$\left(1 - \frac{1}{2}\right) \times \left(1 - \frac{1}{3}\right) \times \left(1 - \frac{1}{4}\right) \dots \left(1 - \frac{1}{n}\right) = \frac{1}{n}$$

$$\text{or } \frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \dots \times \frac{n-1}{n} = \frac{1}{n} \text{ LearnInsta.com}$$