CHAPTER 2

FRACTIONS AND DECIMAL NUMBERS

2.1 You have studied about fractions and decimal numbers in previous classes. Classify the proper and improper fractions from the following.

$$\frac{5}{3}, \frac{6}{11}, \frac{1}{5}, \frac{3}{2}, \frac{3}{7}, \frac{11}{12}, \frac{25}{2}$$

Convert improper fraction so identified into mixed fraction.

You have learnt writing equivalent fraction, addition & subtraction of fractions. Let us refresh them.

Example 1 Write three equivalent fraction of $\frac{2}{5}$.

Solution Equivalent fraction of $\frac{2}{5} = \frac{2\times2}{5\times2} = \frac{4}{10}$ and $\frac{2\times3}{5\times3} = \frac{6}{15}$, $\frac{2\times4}{5\times4} = \frac{8}{20}$

Answer : $\frac{2}{5} = \frac{4}{10} = \frac{6}{15} = \frac{8}{20}$.

Example 2 Ramesh eats $\frac{4}{5}$ part of the bread and Suresh eats $\frac{5}{7}$ part of the bread. Who eats more bread?

Solution We use equivalent fraction and find the greater fraction in $\frac{4}{5}$ and $\frac{5}{7}$

Equivalent fraction of $\frac{4}{5} = \frac{4\times7}{5\times7} = \frac{28}{35}$

Equivalent fraction of $\frac{5}{7} = \frac{5\times5}{7\times5} = \frac{25}{35}$

{ L. C. M. of denominator 5 and 7 = $5 \times 7 = 35$ i.e., denominator of equivalent fraction should be 35

Clearly $\frac{28}{35} > \frac{25}{35}$

In simple form

$\frac{4}{5} > \frac{5}{7}$, i.e., Ramesh eats more than Suresh.

Do and learn

1. Find five equivalent fractions of $\frac{4}{7}$.
2. Compare and write (<, >, =)

(i) $\frac{3}{4} \square \frac{3}{7}$ (ii) $\frac{2}{5} \square \frac{3}{8}$ (iii) $\frac{5}{9} \square \frac{15}{27}$.

You have learnt in previous classes addition and subtraction of fraction. Let us refresh.

Example 3 Raman's home is $\frac{4}{5}$ Km away from school and his aunt's home is $\frac{2}{3}$ Km away from school. Raman wants to go to his aunt's home today. How much distance will he travel in going from home to school and then to aunt's home?

Solution Distance of Raman's home from school = $\frac{4}{5}$ Km

Distance of aunt's home from school = $\frac{2}{3}$ Km

Total distance travelled = $\frac{4}{5} + \frac{2}{3}$

$= \frac{(4\times3)+(2\times5)}{15}$ (L.C.M. (5,3)=15)

$= \frac{12+10}{15}$

$= \frac{22}{15}$

$= 1\frac{7}{15}$ Km.

Example 4 Dinesh studies for $3\frac{3}{4}$ hours every day after school hours. During this time he studies Science and Mathematics subjects for $1\frac{7}{8}$ Hours. He gives remaining time to other subjects. Find the time of studying other subjects.

Solution Total time of study of Dinesh = $3\frac{3}{4}$ Hours

Time given to Science and Mathematics = $1\frac{7}{8}$ Hours

Remaining time = $3\frac{3}{4} - 1\frac{7}{8}$

$= \frac{15}{4} - \frac{15}{8}$

$= \frac{(15\times2)-(15\times1)}{8}$ (L.C.M. (4,8)=8)

$= \frac{30-15}{8}$

$= \frac{15}{8}$

$= 1\frac{7}{8}$ Hours, i.e., Dinesh studies other subjects for $1\frac{7}{8}$ Hours.

Exercise 2.1

1. Find five equivalent fractions of each of the following:

(i) $\frac{2}{8}$ (ii) $\frac{6}{7}$ (iii) $\frac{7}{4}$ (iv) $\frac{100}{45}$

2. Use >, < and = sign for comparison of the following:
   (i) $\frac{3}{7}$ ... . $\frac{2}{5}$ (ii) $\frac{6}{8}$ ... . $\frac{12}{16}$
   (iii) $\frac{11}{15}$ ... . $\frac{12}{17}$ (iv) $\frac{3}{9}$ ... . $\frac{15}{40}$
3. Arrange the following in increasing order
   (i) $\frac{1}{5}, \frac{3}{7}, \frac{7}{10}$ (ii)) $\frac{2}{9}, \frac{2}{3}, \frac{8}{21}$
4. Solve:
   (i) $2+\frac{3}{5}$ (ii) $4+\frac{7}{8}$ (iii) $\frac{3}{5}+\frac{2}{7}$
   (iv) $8\frac{1}{2}-3\frac{5}{8}$ (v) $2\frac{2}{3}+3\frac{1}{2}$ (vi) $\frac{7}{10}+\frac{2}{5}+\frac{3}{2}$
5. A rectangular photo whose length $2\frac{2}{3}$ inch and breadth $\frac{7}{6}$ inch. Find its perimeter.
6. Sheela took $3\frac{3}{5}$ Hours in whitewashing a shop and Neela completed whitewashing of similar shop in $3\frac{5}{7}$ Hours. Who took more time and how much?
7. Distributing the birthday cake among Reena, Teena and Meena; Reena was given $\frac{2}{5}$ part and Teena given $\frac{1}{3}$ part and remaining part was given to Meena. Find the Meena's share.

2.2 Product of Fractions

We know that the area of a rectangle = Length × Breadth. But if length and breadth are given in fractions then how will you calculate the area? Do you agree with this fact that we should know how the fractions are multiplied?

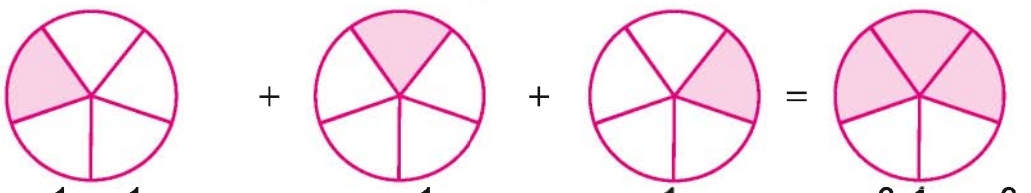
2.2.1 Multiplication of Fraction by a Whole Number

If we want to multiply the fraction $\frac{1}{5}$ by 3 then we add $\frac{1}{5}$ three times.

$$3\times\frac{1}{5}=\frac{1}{5}+\frac{1}{5}+\frac{1}{5}=\frac{1+1+1}{5}=\frac{3\times1}{5}=\frac{3}{5}$$

In graphical representation

We know that multiplication means repeated addition. e.g. 3×4=4+4+4 =12

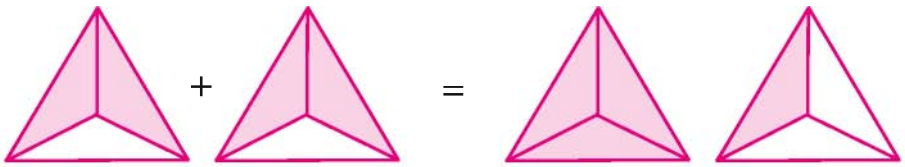


$3x\frac{1}{5}=\frac{1}{5}$ + $\frac{1}{5}$ + $\frac{1}{5}$ = $\frac{3x1}{5}=\frac{3}{5}$

Similarly

$$2 \times \frac{2}{3} = \frac{2}{3} + \frac{2}{3} = \frac{2+2}{3} = \frac{2\times2}{3} = \frac{4}{3} \text{ or } 1\frac{1}{3}$$

In graphical representation:



$$2 \times \frac{2}{3} = \frac{2}{3} + \frac{2}{3} = 1\frac{1}{3}$$

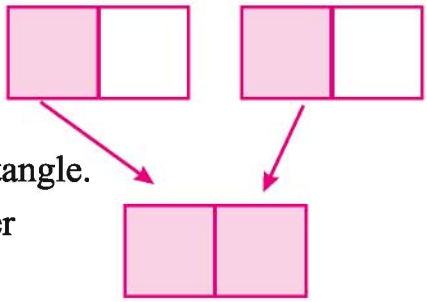
Similarly

$$\frac{2}{7} \times 3 = \frac{2 \times 3}{7} = \frac{6}{7}$$

Similarly for improper fraction, we have

$$4 \times \frac{5}{3} = \frac{4\times5}{3} = \frac{20}{3} = 6\frac{2}{3}$$

Figure shows two similar rectangles.



Each shaded portion represents $\frac{1}{2}$ of the rectangle.

Therefore, both the shaded portions together represent $\frac{1}{2}$ of 2.

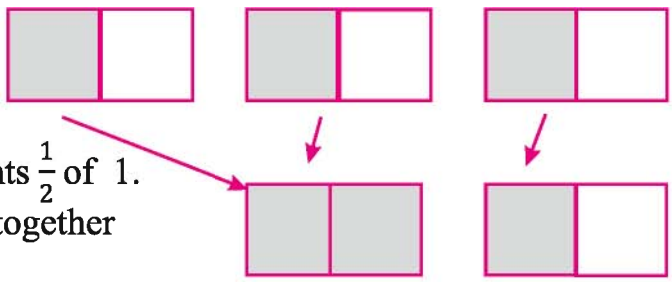
2 *shaded* $\frac{1}{2}$ *portions* when combined represents 1.

Thus, we see that $\frac{1}{2}$ portion of 2 is 1.

We can also denote this as $2\times\frac{1}{2} = 1$

Hence, $\frac{1}{2}$ of $2 = 2\times\frac{1}{2} = 1$.

Similarly look at the rectangles given aside.



Each shaded portion represents $\frac{1}{2}$ of 1.

Hence, three shaded portion together represent $\frac{1}{2}$ part of 3.

3 shaded $\frac{1}{2}$ portions when combined represents $1\frac{1}{2}$, i.e., $\frac{3}{2}$.

Therefore, $\frac{1}{2}$ of 3 is $\frac{3}{2}$ and $3\times\frac{1}{2} = \frac{3}{2}$

Thus, we say that **"of"** represents the multiplication.

Do and learn

Solve: (i) $3 \times \frac{8}{7}$ (ii) $\frac{9}{7} \times 6$ (iii) $4 \times \frac{7}{5}$ (iv) $4 \times \frac{4}{9}$

If the fraction is in mixed form then

$$7\frac{1}{2} \times 5 = \frac{15}{2} \times 5 = \frac{15 \times 5}{2} = \frac{75}{2} = 37\frac{1}{2}$$

$$3 \times 2\frac{5}{6} = 3 \times \frac{17}{6} = \frac{3 \times 17}{3 \times 2} = \frac{17}{2} = 8\frac{1}{2}$$

Do and learn

Solve: (i) $5 \times 2\frac{3}{7} = ?$ (ii) $1\frac{4}{9} \times 6 = ?$

Now, what is the $\frac{1}{2}$ of 10?

Ramesh said "5",

because $\frac{1}{2}$ of $10 = 10 \times \frac{1}{2} = \frac{10}{2} = 5$.

Do and learn

Can you find the value of : (i) $\frac{1}{2}$ of 5 (ii) $\frac{1}{4}$ of 16 (iii) $\frac{2}{5}$ of 25

2.2.2 Multiplication of Fraction with Fraction

A tailor had 13 meters of cloth. In order to sew the cloth, he cuts the 13 meter cloth in 4 equal parts with each part now being $\frac{13}{4}$ meters in length. Now he divided one $\frac{13}{4}$ meters cloth into two equal parts from centre. Think, what will this one part out of the two parts represent?

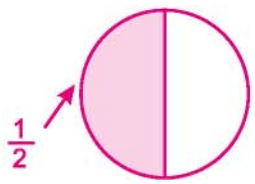
This will represent $\frac{1}{2}$ of $\frac{13}{4}$, i.e., $\frac{13}{4} \times \frac{1}{2}$.

Let us understand the product by taking simple example before we solve it.

$\frac{1}{2} \times \frac{1}{3}$ means $\frac{1}{2}$ of $\frac{1}{3}$.

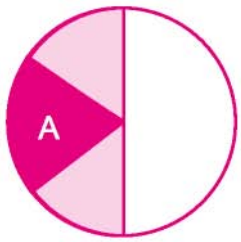
(i) Hence, we first find the $\frac{1}{2}$ of the total.

Figure aside shows $\frac{1}{2}$.



(ii) Now, how will you find $\frac{1}{3}$ of this shaded portion. Dividing the shaded portion ($\frac{1}{2}$ portion) in to three equal parts and taking one of them will represent $\frac{1}{3}$ of $\frac{1}{2}$. We know that $\frac{1}{3}$ of $\frac{1}{2} = \frac{1}{2} \times \frac{1}{3}$.

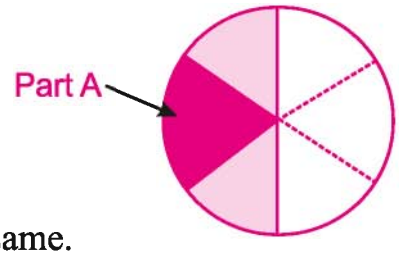
In figure aside, part A represents $\frac{1}{3}$ of $\frac{1}{2}$.



(iii) How much is the part A of total? To find this we divide the unshaded portion in to the portions equal to A. This way we divide the entire unit in to six equal parts and the portion A is the sixth part of it. Hence,

Part A = $\frac{1}{6}$

Therefore, $\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$



It can also calculated as follows:

$$\frac{1}{2} \times \frac{1}{3} = \frac{1\times1}{2\times3} = \frac{1}{6}.$$

Similarly find $\frac{1}{3} \times \frac{1}{2}$ and see if the answer is same.

$\frac{1}{2} \times \frac{1}{3} = \frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$.

Similarly, $\frac{1}{3} \times \frac{1}{4} = \frac{1}{4} \times \frac{1}{3}$ and $\frac{1}{2} \times \frac{1}{5} = \frac{1}{5} \times \frac{1}{2}$.

Do and learn

Find: (i) $\frac{1}{3} \times \frac{1}{7} = \frac{1\times1}{3\times7} =$ ☐ (ii) $\frac{3}{2} \times \frac{4}{7} =$ ☐ = ☐

(iii) $\frac{1}{7} \times \frac{1}{5} = \frac{1\times1}{7\times5} =$ ☐ (iv) $\frac{3}{5} \times \frac{2}{3} =$ ☐ = ☐

Value of product of fractions

You have seen the product of two natural numbers is greater than or equal to both the numbers. Does this happen in case of fractions also? Let us see.

(i) Product of Proper Fractions

Complete the table:

$\frac{1}{3} \times \frac{2}{5} = \frac{2}{15}$	$\frac{2}{15} < \frac{1}{3}$	$\frac{2}{15} < \frac{2}{5}$	Product is less than each fraction
$\frac{1}{5} \times \frac{2}{7} =$	.....	.....	.....
$\frac{3}{5} \times \frac{7}{8} =$	.....	.....	.....
$\frac{2}{5} \times \frac{4}{9} =$	.....	.....	.....

After completing the table, do you agree that the product of two proper fractions is less than the given fractions?

(ii) Let us find the product of two Improper Fractions

$\frac{7}{3} \times \frac{5}{2} = \frac{35}{6}$	$\frac{35}{6} > \frac{7}{3}$	$\frac{35}{6} > \frac{5}{2}$	**Product is greater than each fraction**
$\frac{6}{5} \times \frac{4}{3} =$	.....	.....	.....
$\frac{9}{2} \times \frac{7}{4} =$	.....	.....	.....
$\frac{3}{2} \times \frac{8}{7} =$	.....	.....	.....

After completing the table, do you agree that the product of two improper fractions is more than the given fractions?

Do and learn

(i) Find the product of one proper fraction and one improper fraction and prepare the table showing the result.

Dheeraj has Rs. 25. If he spends $\frac{2}{5}$ of his money in buying notebook and pen then how much money has he spent?

We know that "of" represent the product. Therefore Dheeraj spent the money in buying the notebook and pen

$\frac{2}{5}$ of $25 = 25 \times \frac{2}{5} = \frac{25 \times 2}{5} = 5 \times 2 =$ Rs. 10.

Money left with Dheeraj = 25 – 10 = 15. Find, how much part of 25 this money is.

Example 5 $\frac{1}{5}$ of the total student in a class of 30 like studying English and $\frac{2}{5}$ of total like studying Mathematics and remaining like studying Science.

(i) How many students like studying English?

(ii) How many students like studying Mathematics?

(iii) What fraction of total students like studying Science?

Solution Total number of students in the class = 30

(i) $\frac{1}{5}$ of total like studying English.

Hence, the number of students who like studying English = $\frac{1}{5}$ of $30 = 30 \times \frac{1}{5} = 6$.

(i) Number of students who like studying Mathematics $=\frac{2}{5}$ of 30 $=30\times\frac{2}{5}=12$.

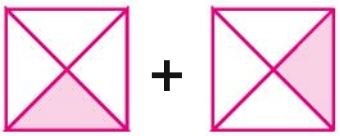
(ii) Number of students who like studying English and Mathematics = 6 + 12 = 18.

Hence, the number of students who like Science = 30 – 18 = 12.

Thus, required fraction is $=\frac{12}{30}$, i.e., $\frac{2}{5}$ part likes studying Science.

Exercise 2.2

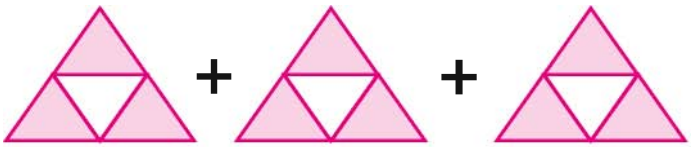
1. Match appropriate product with line diagrams :

(i) 

(a) $\frac{3}{4}$ x 3

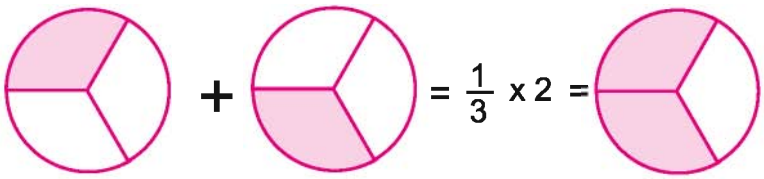
(ii) 

(b) $\frac{1}{4}$ x 2

(iii) 

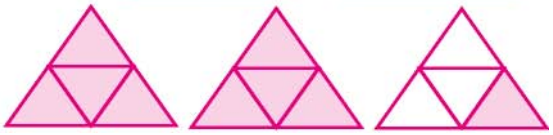
(c) $\frac{3}{5}$ x 3

2. Show the following figures in terms of multiplication (repeated addition):

(i)  = ...

(ii)  = ... = ...

(iii) 

= ..... =  = ...

3. Multiply and express in the simplest form:

(i) $8 \times \frac{3}{5}$ (ii) $\frac{2}{3} \times 4$ (iii) $\frac{5}{2} \times 6$ (iv) $15 \times \frac{3}{5}$ (v) $20 \times \frac{2}{3}$

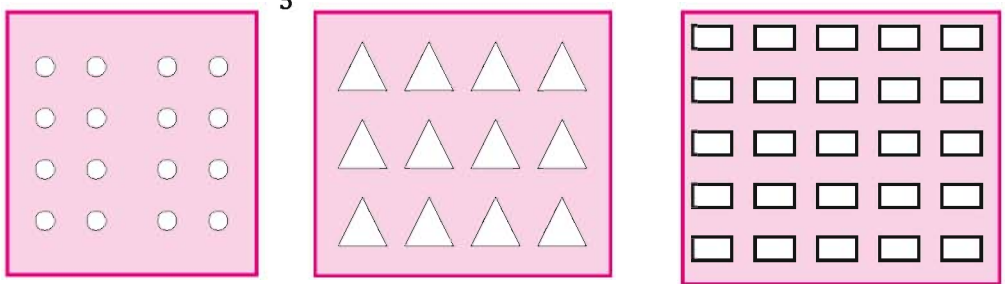
(vi) $18 \times \frac{1}{9}$ (vii) $2\frac{2}{3} \times \frac{6}{7}$ (viii) $12 \times \frac{5}{3}$ (ix) $\frac{3}{8} \times \frac{6}{4}$ (x) $\frac{4}{5} \times \frac{12}{7}$

4. Shade the following:

(i) Fill colour in $\frac{1}{2}$ of the circles in box (a)

(ii) Fill colour in $\frac{2}{3}$ of the triangles in box (b)

(iii) Fill colour in $\frac{1}{5}$ of the rectangles in box (c)



(a) (b) (c)

5. Find the following:

(i) $\frac{1}{3}$ of 27 (ii) $\frac{1}{3}$ of 18 (iii) $\frac{1}{5}$ of 50 (iv) $\frac{3}{4}$ of 24 (v) $\frac{5}{4}$ of 32 (vi) $\frac{3}{7}$ of 28

6. Find

(i) $1\frac{3}{5}$ of 4 (ii) $\frac{2}{3}$ of $5\frac{1}{5}$ (iii) $\frac{8}{17}$ of $3\frac{2}{5}$ (iv) $\frac{3}{8}$ of $9\frac{2}{3}$ (v) $\frac{1}{5}$ of $\frac{3}{5}$ (vi) $\frac{1}{7}$ of $\frac{3}{10}$

7. Multiply the following fractions:

(i) $3\frac{4}{5} \times \frac{1}{4}$ (ii) $\frac{3}{2} \times 6\frac{2}{5}$ (iii) $3\frac{4}{7} \times \frac{3}{5}$ (iv) $3\frac{2}{5} \times 4\frac{3}{8}$

8. Which is greater?

(i) $\frac{2}{5}$ of $\frac{3}{4}$ or $\frac{3}{5}$ of $\frac{5}{8}$ (ii) $\frac{1}{2}$ of $\frac{6}{7}$ or $\frac{2}{3}$ of $\frac{3}{7}$

9. Manisha took 15 Litres Milk for selling it out. She sold $\frac{2}{5}$ part of milk to Kanchan and $\frac{1}{5}$ part of milk to Bhawna and remaining part to a hotel. Find

(i) How much milk she sold to Kanchan?

(ii) How much milk she sold to Bhawna?

(iii) How much milk she sold to hotel?

10. 7 boys were placed each $\frac{3}{4}$ meters apart from the other for PT demonstration on Independence Day. What is the distance between the first and the last boy?

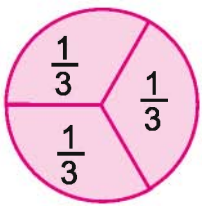
11. Rahul works on a painting $2\frac{3}{4}$ Hours daily. If he takes 8 days to complete this painting then calculate the number of hours he worked.
12. A car travel $23\frac{1}{5}$ Km using 1 Litre petrol. What distance will it travel using $2\frac{3}{4}$ Litre petrol?
13. (i) Write the number in the box so that $\frac{3}{4} \times \square = \frac{6}{40}$.
    (ii) The simplest form of number in the box is .....
14. (i) Write the number in the box so that $\square \times \frac{5}{8} = \frac{10}{24}$.
    (ii) The simplest form of number in the box of (i) is .....

2.3 Division of Fractions

Sumit has a paper strip of length 8 cm. He cuts this strip into 2 cm long small strips. We know that he will get $8 \div 2 = 4$ strips. If he cuts this strip in to small strips of length $\frac{3}{2}$ cm then how many strips will he get? He will get $8 \div \frac{3}{2}$ strips. Similarly a strip of length $\frac{15}{4}$ cm can be cut in to small strips of length $\frac{3}{2}$ cm. We will get $\frac{15}{4} \div \frac{3}{2}$ pieces.
Therefore, we need to divide a whole number by a fraction and a fraction by another fraction. Let us learn this.

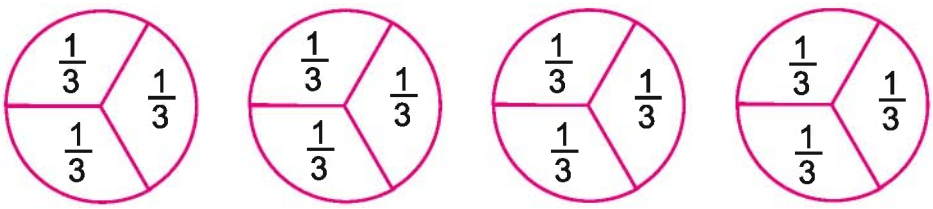
2.3.1 Dividing a Whole Number by a Fraction

We find $1 \div \frac{1}{3}$. It means, how many times $\frac{1}{3}$ appears in 1? How many $\frac{1}{3}$ are seen in the figure aside.



There are three such parts in '1' so that $1 \div \frac{1}{3} = 3$.

Similarly, $4 \div \frac{1}{3}$ = number of $\frac{1}{3}$ part obtained by dividing four such circles into similar $\frac{1}{3}$ parts = 12.



i.e., $4 \div \frac{1}{3} = 12$ such that $4 \div \frac{1}{3} = 4 \times \frac{3}{1} = 12$.
Find, using similar figures, $2 \div \frac{1}{5}$ and $5 \div \frac{1}{2}$.

2.3.2 Inverse of Fractions

Interchanging the numerator and denominators in $\frac{1}{3}$ we get $\frac{3}{1}$. Similarly Interchange the numerator and denominator in $\frac{1}{5}$ and $\frac{2}{3}$.

$\frac{1}{3} \times \frac{3}{1} = 1$, $\frac{1}{5} \times \frac{5}{1} =$ ..... $\frac{2}{3} \times \frac{3}{2} =$ .....

Two non -zero numbers ($\neq 0$) whose mutual product is 1 are known as reciprocal numbers of each other.

We have seen that

$$1 \div \frac{1}{3} = 1 \times \frac{3}{1} = 1 \times \left(\text{reciprocal of } \frac{1}{3}\right)$$

$$4 \div \frac{1}{3} = 4 \times \frac{3}{1} = 4 \times \left(\text{reciprocal of } \frac{1}{3}\right)$$

$$5 \div 1\frac{1}{2} = 5 \div \frac{3}{2} = 5 \times \frac{2}{3} = 5 \times \left(\text{reciprocal of } \frac{3}{2}\right)$$

$$2 \div \frac{3}{4} = 2 \text{ ..... } = \text{ .....}$$

For dividing a whole number by a fraction, multiply the whole number by the inverse of given fraction.

Do and learn

Solve (i) $5 \div \frac{2}{3}$ (ii) $7 \div \frac{3}{4}$ (iii) $6 \div \frac{1}{5}$.

2.3.3 Dividing a Fraction by a Whole Number

What will be the value of $\frac{3}{5} \div 4$.

We can write this in the following manner

$\frac{3}{5} \div \frac{4}{1} = \frac{3}{5} \times \frac{1}{4} = \frac{3}{5} \times \left(\text{reciprocal of } \frac{4}{1}\right) = \frac{3}{20}$.

Similarly, $3\frac{2}{3} \div 5 = \frac{11}{3} \div \frac{5}{1} = \frac{11}{3} \times \frac{1}{5} = \frac{11}{15}$.

Division of a number by 1 gives the same number again.

Do and learn: Fill in the blanks

(i) $2\frac{3}{5} \div 2 = \frac{13}{5} \div 2 =$..... (ii) $\frac{8}{3} \div 5 =$.....=.....

(iii) $2\frac{2}{3} \div 3 =$ .....=.....

2.3.4 Division of a Fraction by Another Fraction

$\frac{1}{2} \div \frac{3}{5} = \frac{1}{2} \times \left(\text{reciprocal of } \frac{3}{5}\right) = \frac{1}{2} \times \frac{5}{3} = \frac{5}{6}$.

Similarly, $2\frac{1}{3} \div 1\frac{1}{4} = \frac{7}{3} \div \frac{5}{4} =$?

Do and learn:

Solve (i) $\frac{3}{5} \div \frac{1}{2}$ (ii) $2\frac{1}{2} \div \frac{3}{5}$ (iii) $5\frac{1}{6} \div \frac{9}{2}$

Exercise 2.3

1. Find
   (i) $12 \div \frac{2}{3}$ (ii) $5 \div 3\frac{4}{7}$ (iii) $3 \div 1\frac{1}{3}$
   (iv) $4 \div \frac{8}{3}$ (v) $6 \div \frac{2}{3}$ (vi) $15 \div \frac{5}{7}$
2. Find the reciprocal of each of the following
   (i) $\frac{3}{7}$ (ii) $\frac{1}{8}$ (iii) $\frac{12}{7}$ (iv) $\frac{5}{8}$ (v) $\frac{9}{7}$
3. Find
   (i) $\frac{3}{7} \div 2$ (ii) $4\frac{3}{7} \div 7$ (iii) $\frac{6}{13} \div 5$
   (iv) $3\frac{1}{2} \div 4$ (v) $\frac{6}{5} \div 3$ (vi) $\frac{7}{3} \div 4$
4. Find
   (i) $\frac{7}{3} \div \frac{8}{7}$ (ii) $2\frac{1}{5} \div \frac{3}{5}$ (v) $\frac{2}{5} \div 1\frac{1}{2}$
   (iv) $3\frac{1}{5} \div 1\frac{1}{5}$ (v) $3\frac{1}{5} \div 2\frac{1}{3}$ (vi) $\frac{3}{5} \div \frac{5}{7}$
5. What will be number of $\frac{1}{4}$ parts of bread if each of 6 breads is divided into equal parts of $\frac{1}{4}$?
6. How many $\frac{1}{2}$ cm long pieces can be cut out of $11\frac{1}{2}$ cm long ribbon?

2.4 Review of Decimal Numbers

We have studied about decimal numbers in previous classes. Let us refresh them. How will we read following numbers?

(i) 24.2 = Twenty Four Decimal Two OR Twenty Four Point Two

(ii) 2.04 = Two Decimal Zero Four OR Two Point Zero Four

(iii) 325.52 = ...

(iv) 56.32 = ...

Study the following table and complete it:

Hundreds (100)	Tens (10)	Ones (1)	One Tenth $\left(\frac{1}{10}\right)$	One Hundredth $\left(\frac{1}{100}\right)$	One Thousandth $\left(\frac{1}{1000}\right)$	Number
4	2	1	2	5	8	421.258
6	0	8	5	0	7	608.507
---	0	3	2	1	0	303.210
8	---	6	---	7	0	876.170
7	8	---	---	3	---	784.035
0	1	2	3	4	5	---

We can also write these numbers in expanded forms as follows:

$$421.258 = 4 \times 100 + 2 \times 10 + 1 \times 1 + 2 \times \frac{1}{10} + 5 \times \frac{1}{100} + 8 \times \frac{1}{1000}$$

Similarly, we can write the remaining numbers given in the table.

$5 \times \frac{1}{100} = \frac{5}{100}$ is the place value of 5 in the given number.

2.4.1 Comparison, Addition and Subtraction of Decimal Numbers

Distance of a city A from city B is 38.750 Km and from city C is 38.075. From which city the distance of city A is more?

(i) Number on the left of decimal are same. Therefore, we compare the digits on right hand side.

(ii) Comparing the number by starting from One tenth place and moving to the right of the decimal we find that $7 > 0$. Hence, $38.750 > 38.075$.

Therefore, the distance of city A from city B is greater.

Do and learn: Which is the smaller number?

(i) 35.37 or 35.07 (ii) 262.327 or 262.372

We use decimal numbers to convert the smaller units of Currency, length and weight in to bigger units. For example:

27 gm = $\frac{27}{1000}$ kg = 0.027 kg

550 Paisa = $\frac{550}{100}$ = Rs. 5.50

1 m 25 cm = 1m + $\frac{25}{100}$ m = 1.25 m

120 m = $\frac{120}{1000}$ km = ... km.

1 kg = 1000 gm
Rs. 1 = 100 Paisa
1 m = 100 cm
1 km = 1000 m

Example 6 Ghisu puts 12 kg 400 gm Guava in a basket and 6 kg 750 gm Blackberry in another basket. How much weight will he carry while going to city?

Solution Weight of Guava in the basket = 12 kg 400 gm = 12.400 kg

Weight of Blackberry in the basket = 6 kg 750 gm = 6.750 kg

Total Weight = 19.150 kg.

Example 7 Durga and Vimla purchased 5 m 25 cm cloth for Salwar Suit. If 2 m 75 cm of cloth is required for Salwar Suit of Durga then how much cloth is left for the suit of Vimla?

Solution Total cloth purchased = 5 m 25 cm = 5.25 m

Cloth used for Durga = 2 m 75 cm = 2.75 m

Cloth left for Vimla = 5.25 – 2.75 = 2.50 m.

Exercise 2.4

1. Compare the following pairs of numbers and identity the greater one:
   (i) 0.7 and 0.07 (ii) 2.03 and 2.30 (iii) 7 and 0.7
   (iv) 1.35 and 1.49 (v) 3.507 and 3.570 (vi) 85.2 and 85.02
2. Covert the following small units in to bigger units:
   (i) 7 paise to Rupees (ii) 800 gm to Kg (iii) 75 Meter to Km
   (iv) 3470 Meter to Km (v) 7 Kg 7 g to Kg
   (vi) 47 Km 75 Meter to Km
3. Write the following numbers in expanded form.
   (i) 25.03 (ii) 2.503 (iii) 205.3 (iv) 2.053
4. Find the place value of 3 in the following numbers:
   (i) 34.82 (ii) 643.45 (iii) 547.03 (iv) 24.203
5. Paras's father brought 7 kg 250 gm Green Chili, 15 kg 750 gm Tomatoes and 950 gm Green Coriander Leaves from the vegetable market. How much vegetable did he bring?
6. Bhawna got Rs. 37.25 in her bank account towards interest and Anita got Rs. 25.50 in her bank account towards interest. Who got more interest amount and how much?
7. How less 42.7 km is from 48 km?
8. What value should be added to the sum of 24.57 and 36.3 to get 70?

2.4.2 Multiplication of Decimal Numbers

Manoj got 2.5 Litres petrol filled in his car. If the cost of petrol is Rs. 66.25 per litre then how much payment Manoj has to make for petrol?

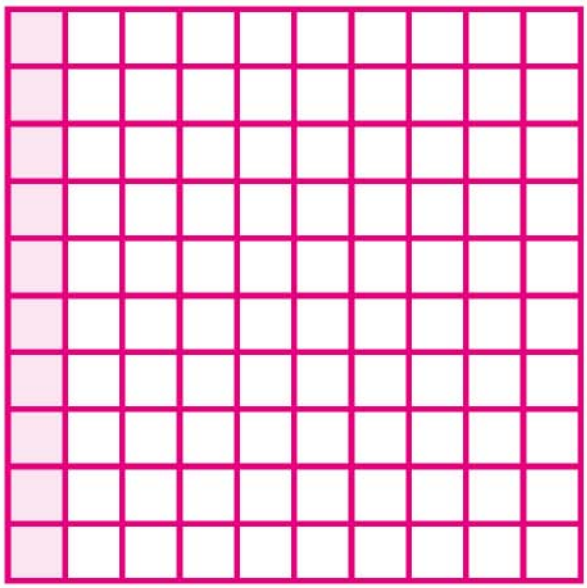
Here, both 66.25 and 2.5 are decimal numbers. Similarly we need to multiply decimal numbers in many cases. Let us learn the multiplication of two decimal numbers. First of all we find the value of 0.1×0.1. We know that

$$0.1 \times 0.1 = \frac{1}{10} \times \frac{1}{10} = \frac{1 \times 1}{100} = \frac{1}{100} = 0.01$$

Look at its picture illustration.

$$0.1 \times 0.1 = \frac{1}{10} \times \frac{1}{10} = \frac{1}{10} \text{ of } \frac{1}{10}$$

Let us first show $\frac{1}{10}$ in the figure.

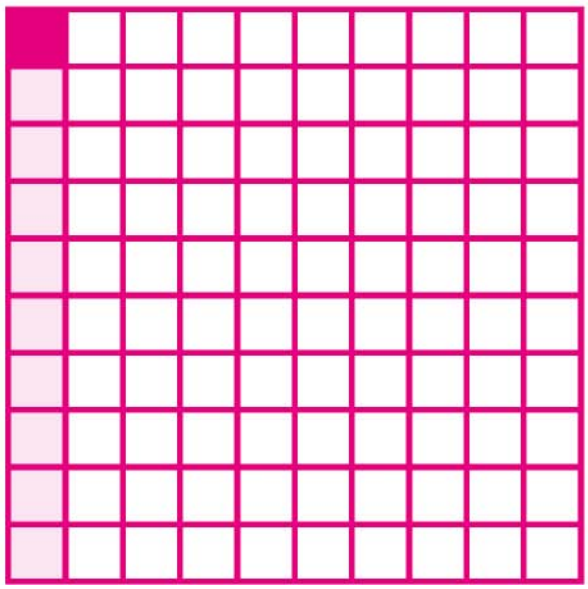


$\frac{1}{10}$

Now we show $\frac{1}{10}$ of $\frac{1}{10}$.

Make 10 part of coloured

Portion and show one part of it.



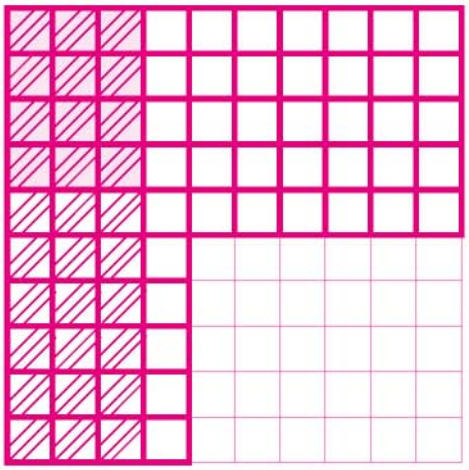
$\frac{1}{10}$ of $\frac{1}{10}$

Hence, $\frac{1}{10} \times \frac{1}{10}$ or $\frac{1}{10}$ of $\frac{1}{10}$ shows $\frac{1}{100}$ of total unit, which is also written as 0.01.

Thus, $0.1 \times 0.1 = 0.01$.

Similarly, $0.3 \times 0.4 = \frac{3}{10} \times \frac{4}{10}$ or $\frac{4}{10}$ of $\frac{3}{10}$.

Representing $\frac{3}{10} \times \frac{4}{10}$ by figure,



the shaded portion shows 12 cells of total 100 cells. Therefore :

$\frac{3}{10} \times \frac{4}{10} = \frac{12}{100}$ or $0.3 \times 0.4 = 0.12$.

This can also be done in the following manner. We first calculate $03 \times 04 = 12$ for 0.3×0.4 Then count the number of digits after decimals in the numbers to be multiplied and put a decimal in the product (here 12) after counting the same number of digits from the right hand side i.e. we will get 0.12.

Similarly, we will find $14 \times 2 = 28$ for 1.4×2 and put the decimal leaving one digit from the right of the resulting product. i.e., we get 2.8.

Do and learn:

Find the value of (i) 2.3×3.5 (ii) 3.7×5 (iii) 2.4×7.35

Example 8 Ganeshi winnows (sorting) 7.5 kg Wheat every day. How much Wheat will she winnow in 10 days?

Solution Ganeshi winnows the Wheat in a day = 7.5 kg

She will winnow the Wheat in 10 days = 7.5×10

= 75.0 kg Ans.

Example 9 A rectangular photo frame has 2.25 m length and 1.5 m breadth. Find its area.

Solution Length of rectangular photo frame = 2.25 m

Breadth of the frame = 1.5 m

Area of the frame = Length breadth = 2.25×1.5

= 3.375 Square meter. Ans.

Also learn:

(i) 1.52×10 (ii) 1.52×100 (iii) 1.52×1000

Solution: (i) Similar to earlier activity, we have

$152 \times 10 = 1520$

Now, counting numbers after decimals

$1.52 \times 10 = 15.20$

(ii) Exactly in similar manner,

$152 \times 100 = 15200$

Now, counting numbers after decimals

$1.52 \times 100 = 152.00$

(iii) Similarly,

$152 \times 1000 = 152000$

$1.52 \times 1000 =$ …….. Put decimals.

> When a decimal number is multiplied by 10 or 100 or 1000, the decimal shifts towards right by the places equal to the number of zeros in 10 or 100 or 1000.

What do you conclude from above results? Are you satisfied with the pattern given in the box above?

Exercise 2.5

1. Find

(i)	7×5.4	(ii)	80.1×2	(iii)	0.08×5
(iv)	3×0.86	(v)	312.05×4	(vi)	6.08×8

2. Find

(i)	3.72×10	(ii)	0.37×10	(iii)	0.5×10
(iv)	1.08×100	(v)	73.8×10	(vi)	0.06×100
(vii)	47.03×1000	(viii)	0.03×1000	(ix)	42.7×1000

3. Find

(i)	4.2×3.5	(ii)	6.25×0.5	(iii)	11.2×0.15
(iv)	0.08×0.5	(v)	101.01×0.01	(vi)	20.05×4.8

4. Find the area of a rectangle whose length is 6.4 cm and breadth is 3.2 cm.
5. A car covers a distance of 25.17 km in 1 Litre petrol. Find how much distance will it cover in 10.5 Litres petrol?
6. Prakash sells 2.500 kg of ghee to Raju every month. How much ghee Prakash would have sold to Raju in 10 months?
7. A side of an equilateral triangle is 4.5 cm. Find its perimeter.
8. Dipika buys a box of Tomatoes at the wholesale rate of Rs. 16.50 per kg from the vegetable market. If the Tomatoes weigh 22.5 kg then how much money will Dipika pay to the wholesaler?

2.5 Division of Decimal Numbers

Shakuntla has bought coloured strips each of length 8.5 cm for decorating her house. She wants to cut the strips in to the pieces of 1.7 cm for decoration. How many pieces can be cut from a strip?

For this we need to find $8.5 \div 1.7$. Let us try to learn with simple examples, how decimal numbers are divided?

2.5.1 Division of Decimal fraction by a Whole Number

Let us find $8.4 \div 2$. We know that 8.4 can be written as $\frac{84}{10}$ because the expanded form of 8.4 is expressed as $\left(8 \times 1 + 4 \times \frac{1}{10}\right)$. Hence

$$8.4 \div 2 = \frac{84}{10} \div 2$$
$$= \frac{84}{10} \div \frac{2}{1}$$

We have learnt in division of fractions that we need to multiply by reciprocal of 2 for division.

$$= \frac{84}{10} \times \frac{1}{2}$$
$$= \frac{84 \times 1}{10 \times 2}$$
$$= \frac{42}{10} = 4.2$$

$$4.2 = 4 \times 1 + 2 \times \frac{1}{10}$$

$$4.2 = \frac{42}{10}$$

Also learn:

(i) $45.32 \div 10$ (ii) $45.32 \div 100$ (iii) $73.25 \div 1000$

Solution: (i) $45.32 \div 10$

$$= \frac{4532}{100} \div \frac{10}{1}$$
$$= \frac{4532}{100} \times \frac{1}{10}$$
$$= \frac{4532}{1000} = 4.532$$

$\left(\text{reciprocal of } \frac{10}{1} = \frac{1}{10}\right)$

(ii) $45.32 \div 100$

$$= \frac{4532}{100} \div \frac{100}{1}$$
$$= \frac{4532}{100} \times \frac{1}{100}$$
$$= \frac{4532}{10000}$$
$$= 0.4532$$

(iii) $73.25 \div 1000$

$$= \frac{7325}{100} \div \frac{1000}{1}$$

$$= \frac{7325}{100} \times \frac{1}{1000}$$

$$= \frac{7325}{100000}$$

$$= 0.07325$$

Do you find any rule in the change of place of decimal in dividing decimal numbers by 10 or 100 or 1000?

Yes, digits in the number and the quotient (result) are same but **decimal displaces from its place towards left by the places equal to number of zeros attached with 1.**

Do and learn: ◆ Divide the given decimal numbers by 10, 100 and 1000.

(i) 132.4 (ii) 1.03 (iii) 40.033 (iv) 4.321

2.5.2 Division of any Whole Number by a Decimal Fraction

Let us see $32 \div 0.4$

$$32 \div 0.4 = 32 \div \frac{4}{10} = 32 \times \frac{10}{4} \quad \left(\frac{4}{10} \text{ Reciprocal of } = \frac{10}{4}\right)$$

$$= 32 \times \frac{10}{4}$$

$$= \frac{(4 \times 8) \times 10}{4} = 8 \times 10 = 80 \text{ Ans.}$$

$$7 \div 1.6 = 7 \div \frac{16}{10} = 7 \times \frac{10}{16}$$

$$= 7 \times \frac{5}{8} = \frac{35}{8} = 4.375$$

Do and learn: ◆ Solve –

(i) $6 \div 1.2$ (ii) $9 \div 4.5$ (iii) $48 \div 0.8$

2.5.3 Division of any Decimal Number by a Decimal Number

Consider $3.25 \div 0.5$.

$$3.25 \div 0.5 = \frac{325}{100} \div \frac{5}{10}$$

$$= \frac{325}{100} \times \frac{10}{5} = \frac{325 \times 10}{100 \times 5} = \frac{65}{10} = 6.5 \text{ Ans.}$$

Similarly,

$$37.8 \div 0.14 = \frac{378}{10} \div \frac{14}{100} = \frac{378}{10} \times \frac{100}{14}$$

$$= \frac{378 \times 100}{10 \times 14} = 27 \times 10 = 270 \text{ Ans.}$$

Do and learn: ◆ Solve

(i) $7.75 \div 0.25$ (ii) $5.6 \div 1.4$ (iii) $42.8 \div 0.02$

Other interesting method:

$$2.73 \div 1.3 = \frac{2.73}{1.3}$$

$$= \frac{2.73}{1.30}$$

$$= \frac{273}{130}$$

$$= \frac{21}{10} = 2.1 \text{ Ans.}$$

$2.73 \div 1.3$ can be written as $\frac{2.73}{1.3}$

To make same number of digits after decimals, zeros can be placed after decimal and then decimal can be removed

(Leaving common factor 13)

Exercise 2.6

1. Find

(i) $0.8 \div 4$ (ii) $0.42 \div 7$ (iii) $3.96 \div 6$ (iv) $842.4 \div 4$

(v) $14.49 \div 7$ (vi) $36 \div 0.2$ (vii) $7 \div 3.5$ (viii) $0.09 \div 3$

2. Find

(i) $4.2 \div 10$ (ii) $98.6 \div 10$ (iii) $0.2 \div 10$

(iv) $143.2 \div 100$ (v) $86 \div 100$ (vi) $8.05 \div 100$

(vii) $44.32 \div 100$ (viii) $1.3 \div 1000$ (ix) $0.06 \div 1000$

3. Find

(i) $1.2 \div 0.3$ (ii) $3.64 \div 0.4$ (iii) $9.6 \div 1.6$

(iv) $1.25 \div 2.5$ (v) $30.75 \div 1.5$ (vi) $4.08 \div 1.2$

(vii) $30.94 \div 0.7$ (viii) $76.5 \div 0.15$ (ix) $7.75 \div 0.25$

4. A scooter covers a distance of 212.5 km in 5 Litres of petrol. How much distance will it cover in one Litre of petrol?

5. The distances of houses of Gopal, Narayan and Krishna from school are 1.5 km, 0.7 km and 1.4 km respectively. Find the average of three distances.

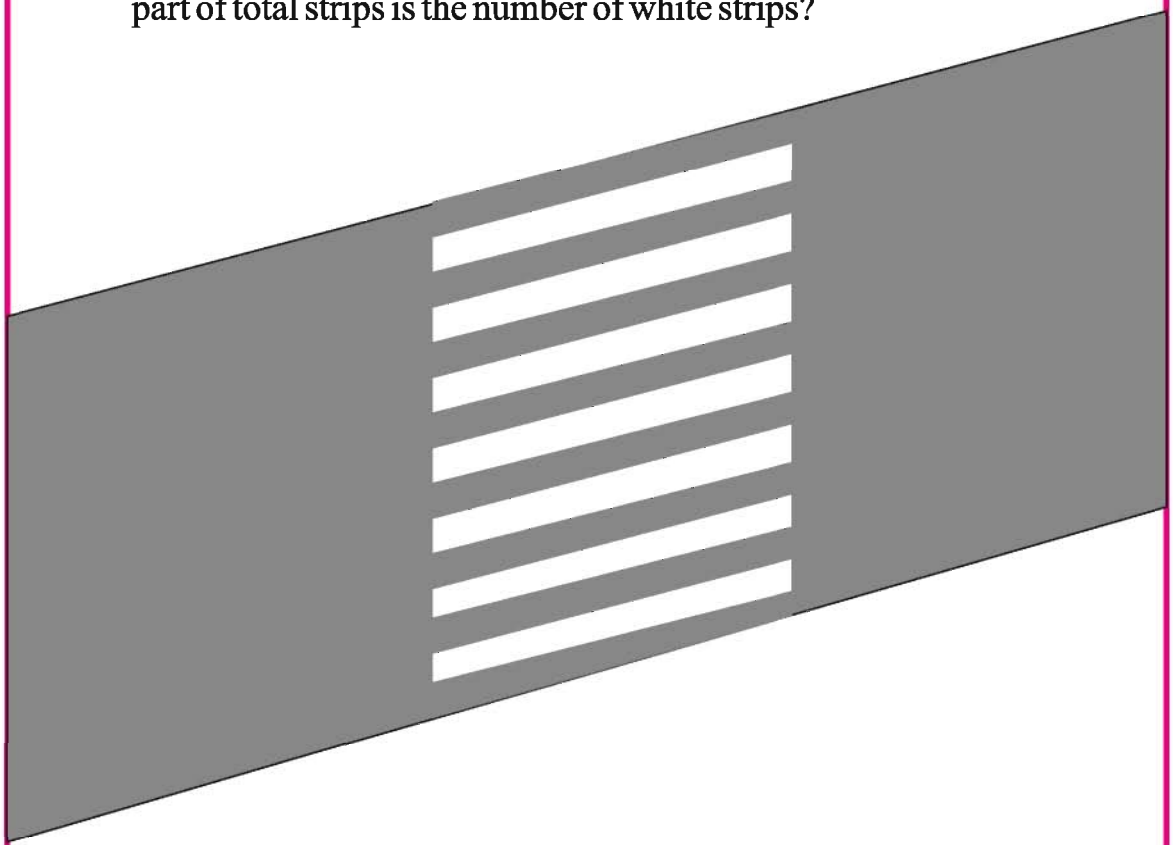
$$\left(Average = \frac{Sum\ of\ Quantities}{Number\ of\ Quantities} \right)$$

6. A car covers 89.1 km distance in 2.2 Hours. Find the distance covered by the car in 1 Hour.
7. Find the area of the square whose perimeter is 44.08 m.
8. If the Area of a rectangle is 93.6 m and the width is 3.6 m. then find the perimeter of the rectangle.

Road Safety

Pedestrian must use Zebra Lines while crossing the road. It reduces the chances of any accident. Zebra lines are the rectangular strips made on road where vehicle drivers slow down the speed and go ahead. Along with this pedestrian use these lines during red signal and cross the road.

1. There are 8 black and 7 white lines at a zebra crossing. So tell what part of total strips is the number of white strips?



2. On one day 100 people crossed the road through zebra crossing of which there were 20 men, 30 women, 10 children and 40 students. Represent all data in decimal form.

We Learnt

1. We have studied about multiplication and division operations on fractions and decimal number in this chapter.

2. Product of fractions = $\frac{\text{Product of Numerators}}{\text{Product of Denomenators}}$

3. Product of two proper fractions is less than the fractions used for multiplication. Product of proper and improper fractions is greater than the proper fraction used for multiplication. Product of two improper fractions is greater than each of the fractions used for multiplication.

4. Mutual change of numerator and denominator in a fraction produces reciprocal fraction.

5. We have learnt how to divide fractions.

(i) Dividing a whole number by a fraction means multiplication of whole number by reciprocal fraction.

(ii) Dividing a fraction by a whole number means multiplication of fraction by reciprocal of whole number.

(iii) Dividing a fraction by another fraction means multiplication of a fraction by the reciprocal of another fraction.

6. When two decimal numbers are to be multiplied, we first multiply them as if they are whole numbers. Then we count the number of digits on the right of decimal and put decimal in the product after the total number of digits from the right.

7. While multiplying the decimal numbers by 10, 100, 1000 we shift ahead the decimal as many places as the numbers of zeros towards right.

8. We have also learnt the division of fractions.

(i) In dividing two decimal numbers we remove the decimals after equalizing the number of digits after decimal and then divide the number in usual manner.

(ii) In dividing decimal numbers by 10, 100, 1000 we shift the decimal towards left as many places as the number of zeros available on 1.