

# **SELF-LEARNING MATERIALS IN MATHEMATICS**

**(PAC PROGRAMME FOR UPPER PRIMARY LEVEL OF KERALA STATE)**

**STANDARD VI**

**ACADEMIC COORDINATOR**

**MR. B. C. BASTI**

**CO-COORDINATOR**

**DR. B.S. UPADHYAYA**



**REGIONAL INSTITUTE OF EDUCATION  
(NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING, NEW DELHI)  
MYSORE-570 006**

**2001**

## FOREWORD

*Regional Institute of Education, Mysore, conducted PAC Programme titled, "Development of Self-Learning Materials for the Upper Primary Schools of Kerala State" during 15<sup>th</sup> to 19<sup>th</sup> January 2001 and 26<sup>th</sup> February to 1<sup>st</sup> March 2001. As many as 17 primary teachers of Kerala state participated in the development of self-learning materials in Mathematics for VI and VII standard classes of Kerala State under the supervision of RIE Maths faculty and five resource persons from outside RIE. Mr. B.C. Basti was the Programme Coordinator. It is an innovative activity with its beginning in RIE, Mysore.*

*The material includes number of illustrations and examples covering fundamental concepts. I place on record my appreciation for the team and Mr. B.C. Basti, the Programme Coordinator, for having brought out useful addition to the existing material in Mathematics. It is sincerely hoped that the material will find maximum utilisation.*

**30<sup>th</sup> March 2001**

**PROF. G. RAVINDRA**  
Principal, RIE, Mysore

## PREFACE

*The PAC Programme titled, "The Development of Self-Learning Materials for the Upper Primary Schools of Kerala State" was organised at RIE, Mysore, in two phases.*

*In the first phase from 15<sup>th</sup> to 19<sup>th</sup> January 2001, the topics for developing self-learning materials were identified and then the self-learning materials were also developed. In this programme the materials were developed by 17 primary teachers of Kerala state under the guidance and supervision of 5 resource persons and RIE Maths Faculty.*

*In the second phase from 26<sup>th</sup> February to 1<sup>st</sup> March 2001, all the 5 resource persons who participated in the first phase finalised the already developed self-learning materials.*

*I thank Principal, RIE, Mysore and Department of Extension Education, RIE, Mysore, for their cooperation in the work.*

**30<sup>th</sup> March 2001**

**B.C. BASTI**  
Programme Coordinator  
Sr. Lecturer in Maths  
DESM, RIE, Mysore

## LIST OF RESOURCE PERSONS

1. K.S. Viswanathan  
Selection Grade Lecturer  
N.S.S. Training College  
Otteppelem  
Kerala State
2. Dr. T.S. Kumara Swamy  
1063/50 'A' Nandi  
II Main, 7<sup>th</sup> Cross  
Vidyaranyaapuram  
Mysore-570 008
3. M.V. Gopala Krishna  
Retired Lecturer  
1047/21, 2<sup>nd</sup> Main, 6<sup>th</sup> Cross  
Vidyaranyaapuram  
Mysore-570 008
4. Dr. S. Nirmala Devi  
Selection Grade Lecturer  
Farook Training College  
Farook College PO  
Kozhikode  
Kerala State
5. N.B. Badrinarayan  
28, 17<sup>th</sup> Cross, 2<sup>nd</sup> Main  
Jayanagar  
Mysore-570 014

### RIE Faculty

Prof. G. Ravindra

Prof. N.M. Rao

Prof. D. Basavayya

Dr. B.S.P. Raju

Dr. B.S. Upadhyaya

Mr. B.C. Basti



# CONTENTS

	PAGE NO.
CHAPTER I      AVERAGE	1
CHAPTER II     FRACTIONS	12
CHAPTER III    INTRODUCTION TO ALGEBRA	23
CHAPTER IV    ANGLES AND TRIANGLES	37
CHAPTER V     MORE ABOUT FRACTIONS	53
CHAPTER VI    DECIMALS	70
CHAPTER VII   PERCENTAGE	82
CHAPTER VIII   VOLUME	90
CHAPTER IX    SOME GEOMETRICAL CONSTRUCTION	95
CHAPTER X     INTEREST	100
CHAPTER XI    PROFIT AND LOSS	105
CHAPTER XII   DISCOUNT	110

# CHAPTER I

## AVERAGE

### Concepts

- 1.1 Divide a group of items equally among some people.
- 1.2 If the number of items happen to be different, finding numbers which represent the groups.
- 1.3 The concept of an average is found as a representative number of group and also as a number obtained on dividing the total by the number of items.
- 1.4 The method of finding the average is arrived at.
- 1.5 The average is found, given the total and number of items.
- 1.6 The average is found after finding the total.
- 1.7 The total is found given the average and the number of items.
- 1.8 The average of a group, from which numbers have left or to which new members have come in, is found based on the original average.
- 1.9 Ravi, Raju and Ramu are friends. They always go to school together. There is a mango tree on their way to school. Whenever they can, they stop to pick the mangoes. They share it equally. On Monday morning Ramu picked 10 mangoes, Raju picked 8 and Ravi picked 11 mangoes. They divide the mangoes equally as usual. How much does each get ?

How do we find it ?

.....

.....

So you have found it, can you help the three friends to divide the mangoes equally on other days ?

### Youth Festival

The table below shows the number of students in the two divisions of classes 5, 6 and 7 in Arkkamoor, UP school. It also shows the points got last week by each class in youth festival. Find the average of each class and find out which class has the best performance ?

Class and division	VA	VB	VIA	VIB	VIIA	VIIB
Number of children	28	32	31	35	26	28
Total points	110	89	121	125	108	132

### 1.2 Cinema Fever

In Aroma cine house, a new film "Thinkasipattanam" released.

The theatre is crowded. Look at the number of tickets sold.

Days	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Number	500	400	600	350	425	540	720

What is the total number of tickets sold in seven days. Suppose we distribute it equally in seven days. Then what would be the number of ticket sold per day. This number is called the average number of tickets sold per day. So, the average number of tickets sold per day = .

### 1.3 A tale of two umbrella makers

There are 6 umbrella makers in Ramu's shop and 4 in Raju's shop. The workers in Ramu's shop make 25 umbrellas every day and Raju's shop make 20 each day. Who are the faster workers ?

The workers in Raju's shop make more umbrellas. So it seem they are faster. But is it correct ? If not what is wrong ? Write your reason below ?

Let us suppose that every worker in Ramu shop makes. The same number of umbrellas. Then how many umbrellas does one worker in Ramu's shop make ?

Number of umbrellas made by 6 workers = 24

$\therefore$  Number of umbrellas made by one worker in Ramu's shop = 4

Now suppose that every worker in Raju's shop make the same number of umbrellas.

Number of umbrellas made by 4 workers = 20

Number of umbrellas made by one worker = 5

Now you can say which group of workers is faster, can't you ?

### 1.4 Mathematics Exhibition

N.S.S., UP school, Kollam, has a mathematics club. They decided to conduct an exhibition. So they split the students into 4 groups for collecting mathematics models. The table below shows the number of children in each group and the number of models they collected.

	Group I	Group II	Group III	Group IV
Number of children	8	5	6	7
Number of models	16	12	14	18

Which group did the best job ?

Can we decide by simply comparing the total number collected by each group ?

Do you have any method ?

1.5 Let us find out the number of models collected by a single member of each group.

	Group I	Group II	Group III	Group IV
Number of children	8	-	-	-
Total number of models	16	-	-	-
Number of models collected by a single member	$16 \div 8 = 2$	-	-	-

Finished ? Now can't you compare the groups ?

Which is the best group ?

To find it, what are the numbers you compared ?

First group : 2

Second group : \_\_\_\_

Third group : \_\_\_\_

Fourth group : \_\_\_\_

So you have a number for each group. Do you know what this number is called ? The average of the group.

Thus we have found, the average of first group = 2

average of second group = \_\_\_

average of third group = \_\_\_

average of fourth group = \_\_\_

Helping the people who are suffering due to earthquake.

The scouts and guides trying to raise funds to help the people who are suffering from the earthquake. In Cheruthuruthy, UP school, 15 scouts collected Rs. 330 and 20 guides collected Rs. 420 who did a better job, scouts or guides ?

Let us do it.

	Number	Money collected	Average
Scouts	15	330	-
Guides	20	420	-

Finished, now which group is better ?

We have seen many examples. Now do you have a method to calculate the average ? Write it below.

**Exercises I**

**1.6 Sanchayika (Student’s Bank) on School**

The table below shows the number of students in the two divisions of a class 5, 6, 7 in Mannankkad, UP school. It also shows the amount deposited last week by each class in Sanchayika. Find

the average of each class and find out which class has the best deposit.?

Class and division	VA	VB	VIA	VIB	VIIA	VIIB
Number of children	28	32	31	30	39	40
Total deposit	336	352	403	210	468	400

## Exercise II

### Onam Sale

Onam discount sale ! Every one wants to buy the home appliances. The shops are crowded. Look at the number of refrigerators sold in Manu's shop.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
10	8	12	13	15	20

What is the total number of fridges sold during these six days.

Suppose we distribute this total equally over six days.

Then what would be the number of fridges sold by day.

This number is called the average.

So the average number of refrigerators sets sold per day.

= \_\_\_\_\_.

### 1.7 Average Earnings

The table below shows the earning of 5 families for each day they worked during a week. Find the average earning of each family per working day. Find out the family having maximum income.

Family	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Aver.
I	x	125	150	80	120	140	75	
II	140	95	125	x	65	105	x	
III	105	85	95	120	85	115	130	
IV	175	x	195	130	150	x	175	
V	80	x	170	90	75	120	140	

### 1.8 Rahim's Vegetable Shop

Rahim has vegetable shop in Manjeri. During a week in which the store was open for six days, he calculated the average income per day as Rs. 2200. What is the total income from the store for these six days.

What do we want to find out ?

How is the average income per day calculated ? By dividing the total income by 6. Isn't it ? So to find the total we multiply the average by 6.

Average income = \_\_\_\_\_

∴ Total income for six days = Average x Six

= \_\_\_\_\_

Look at this problem again. Do you see a method to find the total, if you are given the average and the number of items, what is it ?

#### Exercise

Now can't you complete the table below ?

Total	340		1560		2875	555	
Number of items	12	18		25	23		42
Average		15	60	18		37	35



## Example I

### 1.9 Our football team's journey

The football team has 11 players. They had a match in the next town and decided to travel by train. But Jose was late and missed the train. So he caught a taxi and reached the place in time. The average expense per person for the train journey was found to be Rs. 30. Jose had to pay Rs. 210 as taxi fare. So what is the average expense per player for the journey ?

To find the average, we have to divide the total expense by the number of players in the team.

The total expense of ten players who travelled by train =  $30 \times 10$

$$= \underline{300}$$

Taxi fare = 210

Total expense = 510

Total number of players = 11

$\therefore$  Average =  $510 \div 11$

$$= \text{Rs.}46.38$$

2. Gopalan has 4 cows. He gets an average of 4 litres of milk per cow. He sold one cow which gives 7 litres/day. What is the average quantity of milk Gopalan now gets from the remaining cows ?

The number of cows Gopalan had at first = 4

Average quantity of milk/cow = 4

Total quantity of milk from 4 cows =  $4 \times 4 = 16$

Quantity of milk from the cow which was sold = \_\_\_\_\_

Total quantity of milk from the three remaining cows = \_\_\_\_\_

Average quantity of milk Gopalan now gets/cow = \_\_\_\_\_

3. Gopalan then bought two cows from which he gets an average of 8 litres of milk per day. Now what is the average quantity of milk he gets per day ? Try to find out.

4. In the first week of last month Ramu has opened his egg shop for six days, and an average income Rs. 360 per day. In the second week, it was open 5 days, because of his daughter's marriage. The average income/day was Rs. 426 for these days. How many days during these two weeks was the shop open ? What is the average income/day for these days ?

Total number of days the shop was open during two weeks = \_\_\_\_\_

Total income = \_\_\_\_\_

$\therefore$  Average income = \_\_\_\_\_

### Exercises

1. The total number of biscuits are 55 and there are 11 children. How will it divide equally ?
2. Total income of 9 family members/day is Rs. 630. What is the average income of each member ?
3. Number of item is 24. Average is 32. What is the total ?

4. There are 12 workers in a curry powder factory. The average age of workers is 38. One worker of 49 years is retired. What is the average age of remaining workers ? If a new worker of 31 years is appointed. what is the average age of workers ?
5. In class VIIA. there are 40 students. Their average mark in Mathematics is 28. Then 3 students from VIIB are shifted to VIIA. Their marks in Maths are 36, 42, 30. Then what is the average mark of VIIA ?
6. Find the average when the groups are combined ?

a.

	Total number	Average
Group I	20	28
Group II	15	45

b.

	Total number	Average
Group I	75	40
Group II	25	44

**Ans:** (1) 11, (2) 7, (3) 768, (4) 37; 39, (5) 28.

### Suggested Activities

1. Visit some shops in your neighbourhood and make a list of the available brands of chocolates. Find out the price of each brand and make a table. Calculate the average price. Now check the

brand of chocolate you use and compare its price with the average. Is it higher or lower ?

2. Measure the heights of your classmates. Calculate the average heights of boys and girls in your class. Which is greater ? How many have more than the average height ?
3. Find the average age of your relatives. Is your age smaller or greater than the average ?

## CHAPTER II

### FRACTIONS

#### Concepts

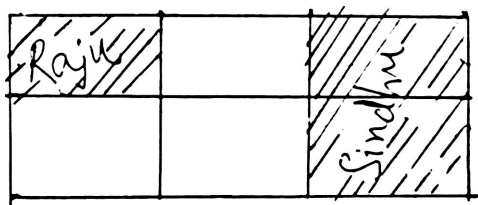
- 1.1 Compare two fractions with same denominator.
- 1.2 Find out the equivalent fraction of a given fraction.
- 1.3 Using the idea of equivalent fraction compare any two fraction with different denominators.
- 1.4 Calculate the sum of two fractions with same denominators.
- 1.5 Calculate the sum of two fractions with different denominators.
- 1.6 Calculate the sum of two fractions using LCM.
- 1.7 Calculate the sum of mixed fraction.
- 1.8 Application of addition of fractions.
- 1.9 Subtraction of two fractions.
- 1.10 Calculate the difference of fractions using LCM.

#### Example

- 1.1 Have you ever shared anything in your life ?

Sindhu and Raju share a chocolate bar in the following way.

Who gets more ?



How many parts are in total = 6 parts.

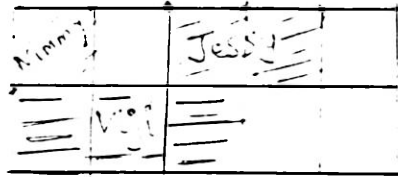
What part of the whole does Sindhu get =  $\frac{2}{6}$

What part of the whole does Raju get =  $\frac{1}{6}$

From the figure it is clear that  $\frac{2}{6}$  is greater than  $\frac{1}{6}$ .

### Example 2

Nimmy, Viji, Jessy share a chocolate as shown below. Who gets more ?



How many parts are in total = 10

What part of the whole does get Nimmy ?  $\frac{1}{10}$

What part of the whole does get Viji ?  $\frac{3}{10}$

What part of the whole does get Jessy ?  $\frac{2}{10}$

From the figure Viji gets more or  $\frac{3}{10}$  is greater than  $\frac{1}{10}$  and  $\frac{2}{10}$

In another way it can be represented as  $\frac{3}{10} > \frac{1}{10}$

$$\frac{2}{10} > \frac{1}{10}$$

From this we know how to compare fractions with same denominator.

$$\frac{2}{6} > \frac{1}{6}$$

$$\frac{3}{10} > \frac{1}{10}$$

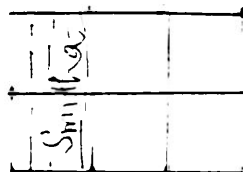
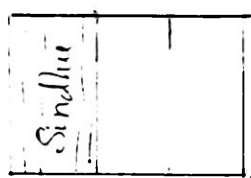
$$\frac{3}{10} > \frac{2}{10}$$

$$\frac{5}{6} > \frac{2}{6}$$

$$\frac{5}{8} > \frac{3}{8}$$

$$\frac{3}{5} > \frac{4}{5}$$

1.2 Sindhu and Smitha share a paper in the following way.



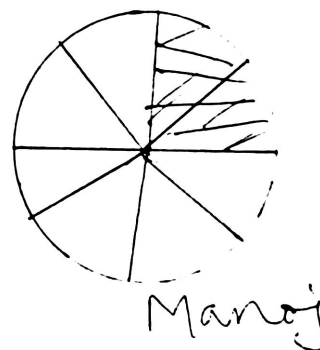
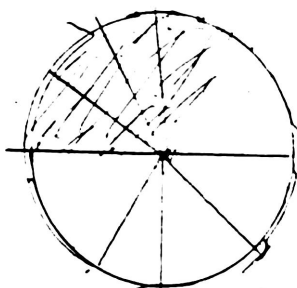
What part of the whole does Sindhu get =  $\frac{1}{3}$

What part of the whole does Smitha get =  $\frac{2}{6}$

From the figure it is clear than both are equal. That is  $\frac{1}{3} = \frac{2}{6}$

### Example 1.1 and 1.2

Rajesh and Manoj share a jilabi in the following way.

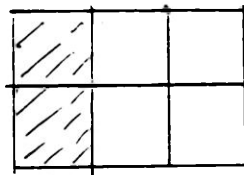
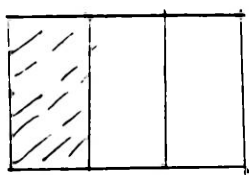


Who gets more ?

Rajesh get more. Why ?

Rajesh get  $\frac{3}{8}$  part and Manoj get  $\frac{2}{8}$  part

1.3 Vini and Nivi share a piece of paper in the following way.



Who gets more ?

Vini gets  $\frac{1}{3}$  portion

Nivi gets  $\frac{2}{6}$  portion

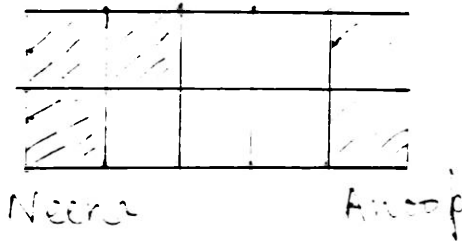
From the figure it is clear that both are same

That is  $1/3 = 2/6$

Can you fill up the following ?

$$1/3 = 2/6 = \quad /9 = \quad /12$$

1.4 Anoop and Neena share a chocolate bar in the following way.



What part of the whole get Anoop =  $2/10$

What part of the whole get Neena =  $3/10$

How will you get their total share ?

Together they get  $2/10 + 3/10 = 5/10$

To add fractions with same denominators add the numerators and keep the denominator as it is.

### Exercise

#### Add

1.  $1/2 + 3/2$

2.  $3/6 + 2/6$

3.  $5/12 + 7/12$

Ans: (1)  $4/2$             (2)  $5/6$             (3)  $12/12$



## 1.5 Addition of fractions with different denominators.

### Example 1

(1) Add

$$2/3 \text{ and } 5/6$$

$$2/3 = 4/6$$

$$2/3 + 5/6 = 4/6 + 5/6 = 9/6$$

### Example II

$$1/3 + 2/5$$

Write equivalent fractions of  $1/3$  and  $2/5$ .

$$1/3 = 2/6 = 3/9 = 4/12 = 5/15 = 6/18 = 7/21 = \dots\dots$$

$$2/5 = 4/10 = 6/15 = 8/20 = 10/25 = 12/30 = \dots\dots$$

$$1/3 = 5/15 \text{ and } 2/5 = 6/15$$

$$\therefore 1/3 + 2/5 = 5/15 + 6/15 = 11/15$$

Here we make the denominators of the two fractions same and then add easily.

### Example III

$$1/5 + 3/4$$

$$1/5 = 4/20 \text{ and } 3/4 = 15/20$$

$$\text{So } 1/5 + 3/4 = 4/20 + 15/20 = \frac{19}{20}$$

### Example I

16. Add  $2/5$  and  $3/4$

$$2/5 = 8/20$$

$$\text{and } 3/4 = 15/20$$

$$\text{So } 2/5 + 3/4 = 8/20 + 15/20 = 23/20$$

How do you know that the common denominator should be 20. The denominators of the given fractions are 5 and 4. Their LCM = 20. Thus we get the common denominator of the equivalent fraction as 20.

## Example 2

$$5/12 + 2/9$$

Find the LCM of the denominators, that is, LCM of 12 and 9.

$$\begin{array}{r|l} 3 & 12, 9 \\ \hline & 4, 3 \end{array}$$

$$\text{LCM is } 3 \times 4 \times 3 = 36$$

Now make 5/12 and 2/9 as numbers with denominator 36.

$$5/12 = 15/36 \text{ and } 2/9 = 8/36$$

$$\text{Therefore } 5/12 + 2/9 = 15/36 + 8/36 = 23/36$$

## Exercises

$$(1) \ 1/4 + 7/10$$

$$(2) \ 4/55 + 9/22$$

$$(3) \ 29/100 + 7/50 + 33/75$$

## Example I

1.7 Find the sum of  $1 \frac{1}{3}$  and  $2 \frac{4}{5}$

First we convert the mixed fractions into improper fractions.

$$1 \frac{1}{3} = \frac{(1 \times 3) + 1}{3} = \frac{4}{3}$$

$$2 \frac{4}{5} = \frac{(2 \times 5) + 4}{5} = \frac{14}{5}$$

Now we have to add  $4/3$  and  $14/5$

LCM of 3 and 5 is 15

$$4/3 + 14/5 = 20/15 + 42/15$$

$$= 62/15$$

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

### Another Method

$$1 \frac{1}{3} + 2 \frac{4}{5}$$

First you add the integer part and then add the fractions.

That is  $(1+2) + (1/3 + 4/5)$

$$= 3 + \left( \frac{5 + 12}{15} \right)$$

$$= 3 + \frac{17}{15}$$

$$= 3 + 1 \frac{2}{15}$$

$$= (3+1) + \frac{2}{15}$$

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

## Example II

Add  $6\frac{1}{2}$  and  $2\frac{1}{4}$

$$6\frac{1}{2} + 2\frac{1}{4} = (6+2) + (\frac{1}{2} + \frac{1}{4})$$

$$= 8 + (\frac{2+1}{4})$$

$$= 8 + \frac{3}{4}$$

$$= 8\frac{3}{4}$$

## Exercises

Add the following

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

(2)  $6\frac{1}{2} + 1\frac{1}{4}$

(3)  $4\frac{1}{3} + 2\frac{2}{9}$

## Exercises

1. There are three bottles containing milk. First bottle contains  $\frac{3}{4}$  litres, second  $\frac{7}{9}$  litre and third  $\frac{7}{6}$  litre. Find the total quantity of milk contained in the three bottles.
2. What is the perimeter of a triangle whose sides are  $4\frac{1}{2}$ ,  $5\frac{7}{8}$  and  $4\frac{3}{4}$  cms.

## 1.9 Example 1

From a piece of cloth measuring  $\frac{9}{15}$  meters a length of  $\frac{4}{15}$  metres is cut what is the length of the remaining piece of cloth. How will you get the length of the remaining piece ? Subtracting  $\frac{4}{15}$  from  $\frac{9}{15}$ .

That is  $9/15 - 4/15$

$$= (9-4)/15 = 5/15 = 1/3$$

How will you get it ?

$5/15$  and  $1/3$  are equivalent fractions.

By the same procedure as addition, we can do the subtraction also.

### 1.10 Example 2

$$7 \frac{2}{3} - 4 \frac{11}{12}$$

$$= \frac{23}{3} - \frac{59}{12}$$

$$= (92 - 59)/12 = 33/12 = 2 \frac{9}{12}$$

$9/12$  can be written as  $3/4$  why ?

Because they are equivalent fraction.

$$\therefore \text{Answer} = 2 \frac{3}{4}$$

### Exercises

1. Subtract the second fraction from the first.

(a)  $11/5 - 2/5$

(b)  $6/14 - 5/21$

(c)  $12 \frac{3}{5} - 9 \frac{14}{15}$

### Example

A roll of carpet is 50 sqms in area. Arun used  $15 \frac{1}{2}$  sqms for covering the floor of the hall and  $24 \frac{1}{4}$  sqms for covering the floor of the room. How much carpet is left unused.

What is the total area of carpet = 50 sqms

Area of covering hall =  $15 \frac{1}{2}$  sqms

Area of covering room =  $24 \frac{1}{4}$

∴ Total area used is =  $15 \frac{1}{2} + 24 \frac{1}{4}$

$$= \frac{(15 \times 2) + 1}{2} + \frac{(24 \times 4) + 1}{4}$$

$$= 31\frac{1}{2} + 9\frac{7}{4}$$

$$= 62\frac{2}{4} + 9\frac{7}{4} = 159\frac{9}{4}$$

$$\therefore \text{Remaining area} = 50 - \frac{159}{4} = \frac{(50 \times 4) - 159}{4}$$

$$= \frac{200 - 159}{4} = \frac{41}{4} = 10 \frac{1}{4} \text{ sqm}$$

#### Another Method

$$= 50 - (15 \frac{1}{2} + 24 \frac{1}{4})$$

$$= 50 - (31\frac{1}{2} + 9\frac{7}{4})$$

$$= 50 - ((62 + 97)/4)$$

$$= 50 - (159/4)$$

$$= \frac{(50 \times 4) - 159}{4}$$

$$= \frac{200 - 159}{4}$$

$$= \frac{41}{4}$$

$$= 10 \frac{1}{4} \text{ sqms}$$

**Exercises**

1. In a field of 5 acres, vegetables are grown in  $\frac{2}{5}$  acres and fruits are grown in  $\frac{1}{6}$  acres. What is the remaining area of the field ?

**Suggested Activity**

In the following magic square each row, each column and each diagonal have the same sum. Write the value in the blank square.

$\frac{3}{8}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{23}{24}$
$\frac{5}{6}$	$\frac{7}{8}$		$\frac{7}{12}$
	$\frac{5}{12}$		
$\frac{11}{12}$			$\frac{1}{2}$

# CHAPTER III

## INTRODUCTION TO ALGEBRA

Mathematics consists of different branches. Some of the branches are Geometry, Arithmetic, Dynamics, Mechanics, Calculus, etc. The branch of mathematics in which symbols are used instead of numbers is called Algebra.

3.1 Symbols can be used instead of numbers.

3.2 All symbols can give values.

3.3 Language statements can be changed into statements using symbols and numbers.

3.4 Values of "statements including symbols" can be calculated.

3.5 Letters can be used instead of symbols.

3.6 Language statements can be changed into statements using letters and numbers.

3.7 Instead of statements using letters and numbers similar language statements can be formed.

3.8 The idea of variable can be created.

3.9 Statements can be formed using variables.

3.10 Algebraic statements can be identified.

3.11 Values of algebraic statements can be found out.



3.12 Formulae can be formed and problems can be solved by using variables.

3.1 Have you ever seen the price list displayed in shops ?

For example we can see how a price list in a stationary shop is prepared ?

Name of articles	Price in Rs.
Soap	
Pencil	2
Powder	30
Match Box	50 paise
Mirror	

Here we do not know what is the price of mirror and soap. So we can use different symbols like O, L instead of the price of those articles.

Name of articles	Price in Rs.
Soap	L
Pencil	2
Powder	30
Match Box	50 paise
Mirror	O

We can ask about the price of soap and mirror in another shop  
 The price of mirror is 10 Rupees and soap is 7 Rupees 50 paise.  
 How can we write this information ?

The price of  $\_$  = 7 Rs. 50 paise

The price of O = 10 Rs.

From this we can understand that symbols can be used instead of numbers.

3.2 Raji wants to buy a soap and a pen. But she does not know how much is the price. Then she imagines the price of one soap is '\*' and the price of one pen is '⊥'. And she checked the price list shown in the nearest shop. The price list is given below.

Article	Price in Rs.
Cinthol	8
Lifebuoy	7.50 paise
Chandrika	7
Rexona	8
Reynolds	6
Rotomac	6
Camel	7

There were soaps and pens of different brands. The price of an article differs according to the company. So she prepares a detailed price list.

Price instead of '*'	Price instead of '□'
8, 7.50 paise, 7, 8	6, 6, 7

From this we can understand that all symbols can be denoted to represent values. E.g.: Here the number of boys in 5<sup>th</sup> standard to 7<sup>th</sup> standard is indicated by the symbol 'O' and the number of girls in 5<sup>th</sup> standard to 7<sup>th</sup> standard is indicated by the symbol '□'. Then find out the values of 'O' and the value of '□'.

Class	Boys	Girls
5	'O' = <u>13</u>	'□' = <u>18</u>
6	'O' = <u>20</u>	'□' = <u>22</u>
7	'O' = <u>15</u>	'□' = <u>15</u>

3.3 If your age is □, then what will be your age after four years ? It should be □ + 4.

Then what was your age before eight years - It should be □ - 8.

What will be two times of your present age = □ x 2.

Language statements can be changed into statements using symbols and numbers.

**E.g.:** If the price of one note book is '▼', then

1. What will be the amount if we add 3 Rs. with the price of a note book = ▼ + 3.

2. What will be the amount if we subtract 2 Rs. From the price of a note book = ▼ - 2.
3. What is the price of two note books = ▼ x 2.
4. In the price list given below the symbol '⊙' shows the price of 100 g. Tooth paste and the symbol '✱' shows the price of school bag. Then find out the least price of '⊙ + ✱' after collecting the price of those articles of different brands from your nearest shop.

⊙	15	13	14	14.50
✱	40	55	30	40
⊙ + ✱	55	68	44	54.50 p

Least price = 44

Thus we can understand that the values of statements including symbols can be calculated.

### Self-Learning Activity

Indicate the marks of five students in your class in Mathematics and Science papers by using different symbols. And find out who got the highest mark after finding out the total marks in both papers.

3.5 We already know that language statements can be changed into statements using symbols and numbers. Letters can be used instead of symbols in such statements.

E.g.: The weight of Raju is shown by the symbol '÷' and the weight of the Malu is shown by the symbol '●'. Then what is the total weight of Raju and Malu ?

$$\text{Total weight} = \div + \bullet$$

Here the symbol ÷ can be indicated by the letter 'r'.

And the symbol ● can be indicated by the letter 'm'.

$$\text{Total weight} = r + m$$

From this example we can understand that letters can be used instead of symbols.

### **Suggested Activity**

Indicate the names of the students in your class by using different symbols. And write the first letter of their names instead of the symbols used.

3.6 Let us assume that the total number of boys in your class is 'x', and the total number of girls in your class is 'y'. If we add ten to the total number of students, what will be the result ?

$$\text{Ans: } x + y + 10$$

Like this we can understand that language statements can be changed into statements using letters and numbers.

### **Exercise 1**

Leela got 'x' chocolates, she gave two chocolates to Rani. If so how many chocolates Leela have ?

$$\text{Ans: } x - 2$$

3.7 If the total number of boys in your class is 'y', how can you write the statements like ' $y + 5$ ', ' $y - 10$ ', etc. into similar language statements ?

1.  $y + 5$  --- Add five to the total number of boys.

2.  $y - 10$  --- Subtract ten from the total number of boys.

E.g.: If the age of Ramesh is 'x', how can you write ' $x \times 2$ ' into similar language statement ?

Ans:  $x \times 2$  --- Two times the age of Ramesh.

3.8 Suppose there are six balls in your bag. Some of them are black and the rest of them are white suppose the black balls are 'x' and the white balls are 'y'.

Then the total number of balls should be  $x + y = 6$ . We can see in how many ways this can be written ?

1. Black balls = 1, white balls = 5  
 $x + y = 1 + 5 = 6$

●	○	○
○	○	○

2. Black balls = 2, white balls = 4  
 $x + y = 2 + 4 = 6$

○	○	○
○	●	●

3. Black balls = 3, white balls = 3  
 $x + y = 3 + 3 = 6$

●	○	○
●	●	○

4. Black balls = 4, white balls = 2  
 $x + y = 4 + 2 = 6$

○	●	○
●	●	●

5. Black balls = 5, white balls = 1  
 $x + y = 5 + 1 = 6$

●	●	●
●	●	○

The results we have got in different ways are given below.

$$x + y = 1 + 5$$

$$x + y = 2 + 4$$

$$x + y = 3 + 3$$

$$x + y = 4 + 2$$

$$x + y = 5 + 1$$

Here 'x' takes values 1, 2, 3, 4, 5. 'y' also takes values 1, 2, 3, 4, 5.

Here 'x' and 'y' take values more than one. Then 'x' and 'y' are known as variables.

### Exercise

If we divide the students in a class into several groups to go for an excursion, Leela's group contains 8 students. Among them the boys are 'x' and the girls are 'y'. Thus what can be the values taken by 'x' and 'y' ? Find out the values of 'x' and 'y' after filling the table given below:

$x + y = 8$	The possible values of x and y
$x + y = 0 + 8$	
$x + y = 1 + 7$	
$x + y = 2 + 6$	
$x + y = 3 + 5$	
$x + y = 4 + 4$	
$x + y = 5 + 3$	
$x + y = 6 + 2$	
$x + y = 7 + 1$	

'x' can have the values = 0, 1, 2, 3, 4, 5, 6, 7

y' can have the values = 1, 2, 3, 4, 5, 6, 7, 8

3.9 If the number of mathematics books in your library is 'x', and the number of science books in your library is 'y'.

The total number of mathematics and science books in your library =  $x + y$ .

The number of mathematics book =  $x$

The number of science book =  $y$

Total number of books =  $x + y$

In  $x + y$ , if  $x = 20$  and  $y = 10$

Then  $x + y = 20 + 10 = 30$

Thus the value of the statement ' $x+y$ ' is 30. Hence we can understand that statements can be formed using variables.

### Self Learning Activity

Give different letters to indicate the total number of your note books and text books and find out the total number of all books.

3.10 Now we are already familiar with the statements including variables. The statements including variables are known as algebraic statements. This is an important branch in mathematics. This branch is known as Algebra.

For instance  $x + y = 7$ ;  $x + y > 2$ , etc. are algebraic statements. Write ten algebraic statements.



3.11 We can find out the values of algebraic statements.

Example:

(1) If  $x = 20$ , what will be the value of  $x + 4$  ?

(2) If  $x = 12$ , what will be the value of  $x - 7$  ?

Ans: (1)  $x + 4 = 20 + 4 = 24$

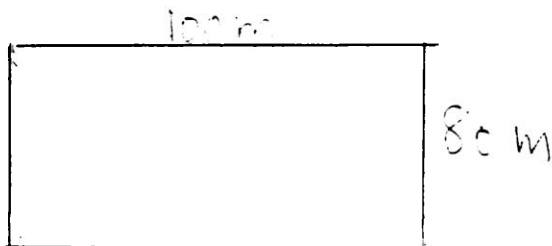
(2)  $x - 7 = 12 - 7 = 5$

### Exercises

Make different algebraic statements and find out the value of variable which is not given.

3.12 We can form formula by using algebraic statements.

Suppose the playground of your school is in rectangular shape. And length of the ground is 100 m and breadth is 80 m. If we construct a wall around the playground, what will be the length of the wall ?



Length of the wall = Perimetre of the rectangled shaped playground

$$\begin{aligned}\text{Perimetre of the rectangle} &= 100 + 100 + 80 + 80 \\ &= 360 \text{ m}\end{aligned}$$

We can also find out the perimetre of the rectangle in another way.

$$\text{Length} + \text{Breadth} = 100 + 80 = 180 \text{ m}$$

$$2 \times (\text{Length} + \text{Breadth}) = 2 \times 180 = 360 \text{ m}$$

The perimeter of a rectangle =  $2 \times (\text{Length} + \text{Breadth})$ . Instead of writing length we can use 'l' and instead of writing breadth we can use 'b'.

$$\text{Perimetre} = 2 \times (l + b)$$

We can indicate 'p' for perimetre.

$$\text{Thus } p = 2 \times (l + b)$$

**E.g.:** The length of the garden of Ramu is 15 m and the breadth is 11 m. Then length of the garden of Antony is 10 m and the breadth is 9 m. Both the gardens are rectangle in shape. Both of them construct fence around their garden. Then whose fence should be longer ?

Length of Ramu's garden = 15 m

Breadth of Ramu's garden = 11 m

$$\begin{aligned}\text{Perimetre} &= 2 \times (l + b) = 2 \times (15 + 11) \\ &= 2 \times (26) \\ &= 52 \text{ sqm}\end{aligned}$$

Length of Antony's garden = 10 m

Breadth of Antony's garden = 9 m

$$\begin{aligned}\text{Perimetre} &= 2 \times (l + b) = 2 \times (10 + 9) \\ &= 2 \times (19) \\ &= 38 \text{ sqm}\end{aligned}$$

So now you know whose fence is longer.

Hence we can see that Ramu's fence is longer than Antony's fence.

**E.g.:** If the length of one side of a square is 10 cm, we know that  
 perimeter =  $10 + 10 + 10 + 10 = 4 \times 10 = 40$  cm.

If the length of one side of the square is 10 cm. Then  
 perimeter should be  $4 \times 10$  cm. If the length of the one side of the  
 square is 20 cm, then perimeter should be  $4 \times 20$  cm.

Like this we can say that if the length of one side of the square  
 is 'a' cm.

Then perimeter =  $4 \times a$  cm

Perimetre, P =  $4a$

In the table given below, the lengths of one side of squares  
 are given. Find out each of their perimeter ?

a	15	10	8	7	20	13
4a	4x15	4x10	4x8	4x7	4x20	4x13
P	...	...	...	...	...	...

**E.g.:** Haris have a rectangle shaped rubber estate. The length of the  
 estate is 80 m and breadth is 75 m. Then find out its area.

We already know that area of rectangle = Length x Breadth

Here area of the rectangle shaped rubber estate

= Length x Breadth of the estate

=  $80 \times 75$

= 6000 sqm

Suppose the length is 'l', breadth is 'b' and area is 'A'.

Then area,  $A = l \times b$

### Exercise

In the table given below the length and breadth of different rectangles are given. Find out their area.

l	25	15	20	13	6
b	10	8	12	12	14
lb	25x10	15x8	20x12	13x12	6x14
A	...	...	...	...	...

### PROJECTS

1. Prepare yourself a price list in a fruit stall and give different symbols instead of the price of the fruits which you do not know.
2. Prepare a chart listing the marks of quarterly examination of the students in your class. If you do not know the marks of any students. Indicate that marks by using different symbols. After consulting them write the marks instead of symbols used.
3. Mark different language statements for comparing the difference of heights of students in your class using symbols and numbers.
4. Use different letters to indicate the boys and girls in your class.  
Write different language statements by using letters and numbers.
5. Make different language statements using letters and numbers.  
And find out similar language statements for them.

6. Find out the prices of different brands of tooth brushes from your nearest stationary shop. And indicate the prices by using one letter.
7. Make algebraic statements by using different variables to indicate different problems in daily life.


# CHAPTER IV

## ANGLES AND TRIANGLES

### Concepts

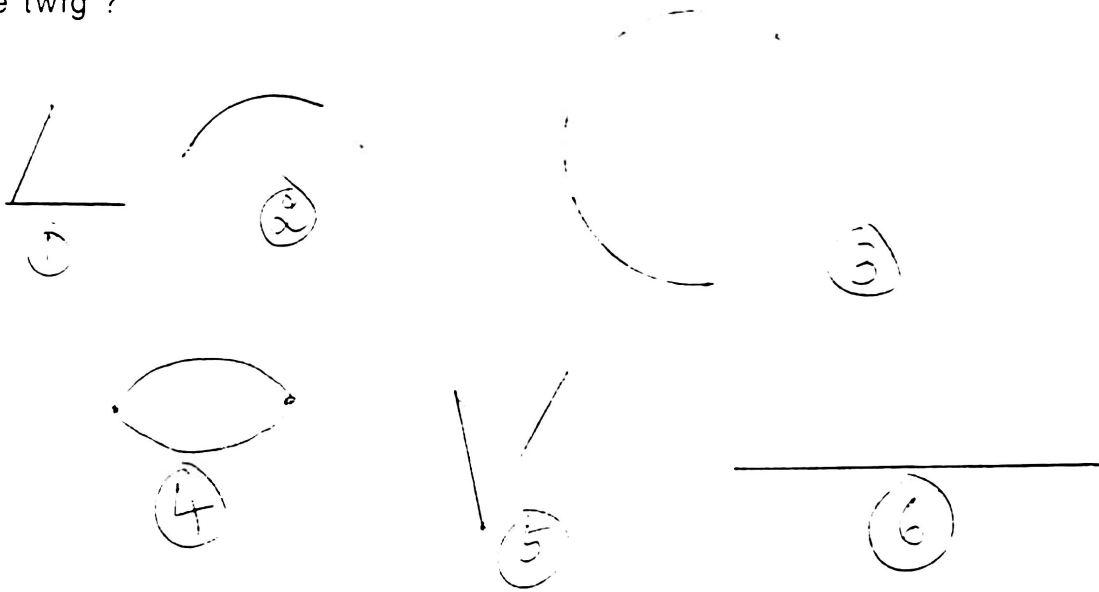
- 4.1 Identification of the shape of an angle
- 4.2 Recognition of the vertex and arms of an angle
- 4.3 Name of an angle
- 4.4 Measurement of the angles
- 4.5 Different types of angles
- 4.6 To draw an angle of a given measure
- 4.7 Supplementary and complementary angles
- 4.8 Triangles

### 4.1 Identification of the shape of an angle

Amar went to village with his parent during summer vacation. There, he went to a jungle with his friends (village lads). His friends were using catapult instead of pistol for shooting. He was surprised because he saw the catapult for the first time. So he wanted to make a catapult. His friends described the method how to make a catapult. First you need a twig like this . Then two strips of rubber and some string.

Don't you want to make one also ? Then first collect a twig of the proper shape. Look at the shape of the twig.

Now look at the figure below. Which of the figure have the shape of the twig ?



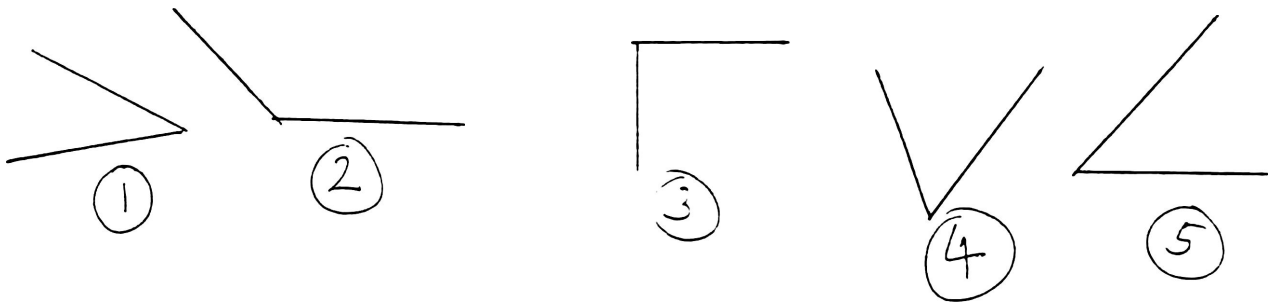
Have you found out ? Then write the number below 1 and 5.

Figure of this shape have a name. Have you heard about that ? No !

Don't you want to know it ? *It is called as angle !*

#### 4.1.1 Drawing Angles

Here are some examples of angles.

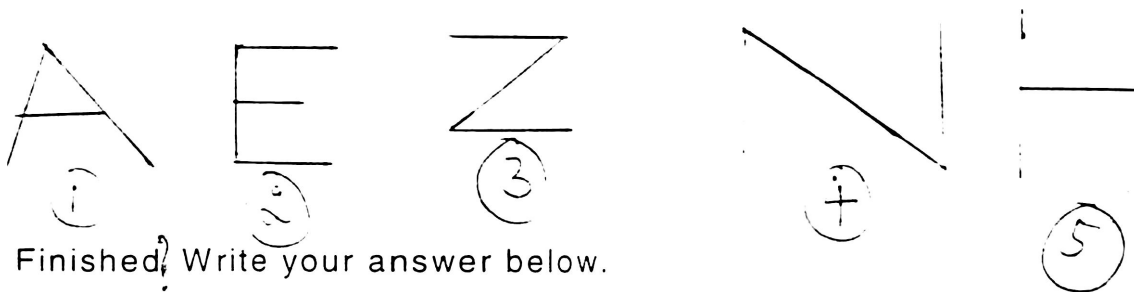


Draw different types of angle in your note book.

#### 4.1.2 Angles

With the help of two sticks form an angle. It will be like  $\angle$ . With the help of three sticks form a triangle. It will be like this  $\Delta$ . How

many angles are there in triangle. Look at the figures below. Can you count the number of angles in each figure ?



Finished? Write your answer below.

Number of angles in Fig. 1.

Number of angles in Fig. 2.

Number of angles in Fig. 3.

Number of angles in Fig. 4.

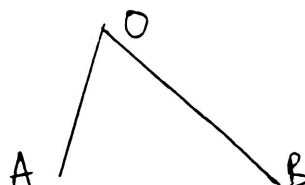
Number of angles in Fig. 5.

Find out and write down

1. the number of angles made by the edges of a table top. (4)
2. the number of angles formed by the edges of a blackboard. (4)
3. the number of angles formed by the edges of a set square in your instrument box. (3)

#### 4.2 Recognition of the vertex and arms of an angle

Collect two sticks to form an angle. The angle is formed by two sticks. The sticks are called the arms of the angle and the meeting point of two sticks is called vertex. Look at the angle in the picture.



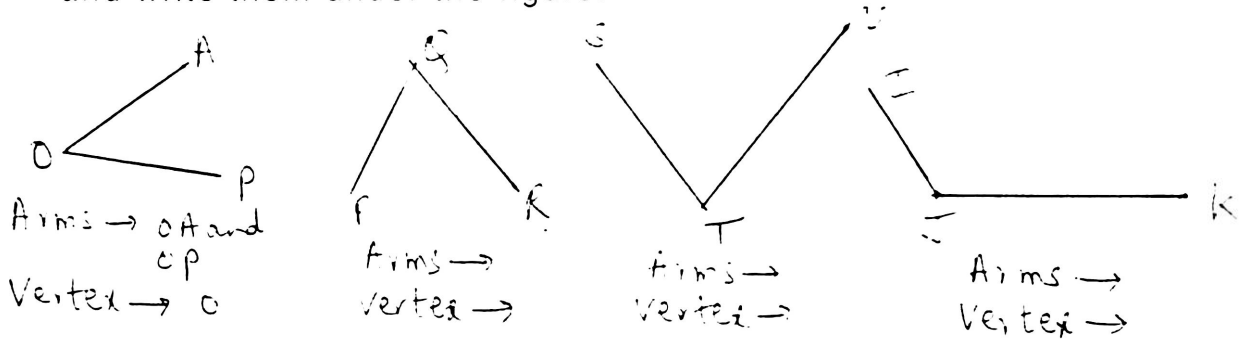
Suppose OA and OB are the two sticks as shown in the figure.



OA and OB are called the arms of the angle. There is a point which is on both arms, isn't it ? Which is it ?

'O' is the point which is common to both arms and it is called the vertex of the angle.

In each of the figure below, find the arms and vertex of the angle and write them under the figure.



### 4.3 Name of an Angle

In the previous part you learnt how to identify the arms and vertex of an angle. We celebrate a ceremony for naming a new born baby to identify him. Can you say the name of that ceremony. Like that, to identify the angle we name it.

Let's look at the picture.

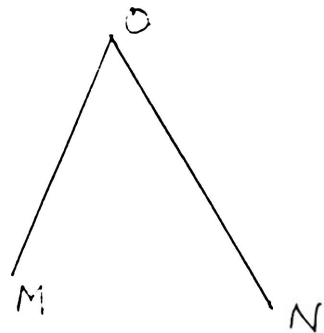
What's it ? It is an angle.

What are the names of its arms ?

OM, ON.

What is the name of its vertex 'O' ?

Now let's name this angle as angle MON.



Using a special symbol, we write it as  $\angle MON$  and read it as angle MON.

Note the order of three letters.

The same angle has another name also  $\angle NOM$ .

Did you note the order of the letter ?

Anything peculiar ?

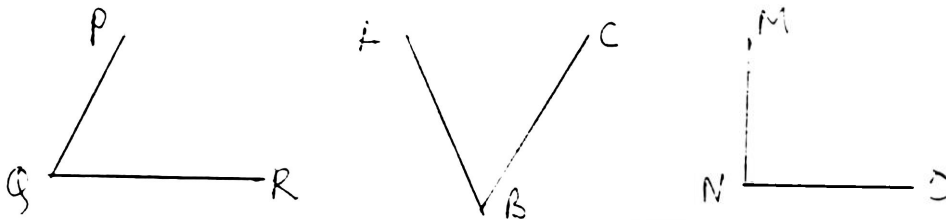
In both names, the name of the vertex is in the middle, isn't it?

We found the names of the arms and vertices of four angles earlier, didn't we ? You can now write their names below.

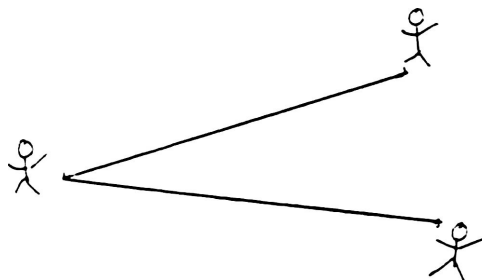
### Exercises

Some angles are drawn below. Write the name of each angle.

Write the names of its vertex and arms also.



An activity will help to find out that the spread of an angle does not change when the length of the arms are increased.

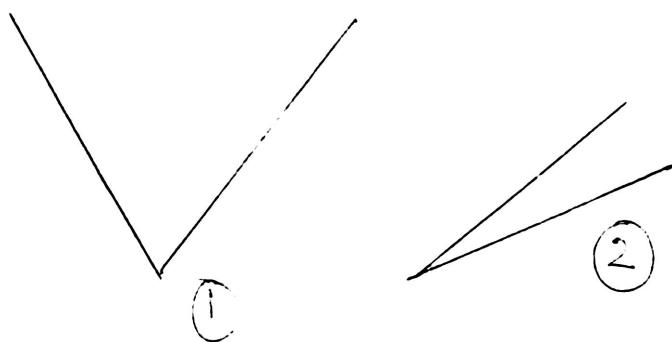


Let three students make an angle with a string as shown in the figure. Let the class observed that by increasing or decreasing the length of the string, the spread of the angle is not changed. The length of the string must be increased without the first three

students changing their position. All the students can do this activity using straw.

If the students change their position and increase or decrease the spread of the angle, students can understand the concept of the increase and decrease in the spread of an angle.

If the two arms of the angle come closer then decrease in the space of an angle. If the two arms go away from each other there is an increase in the spread of an angle. Here are two angles look at their arms.



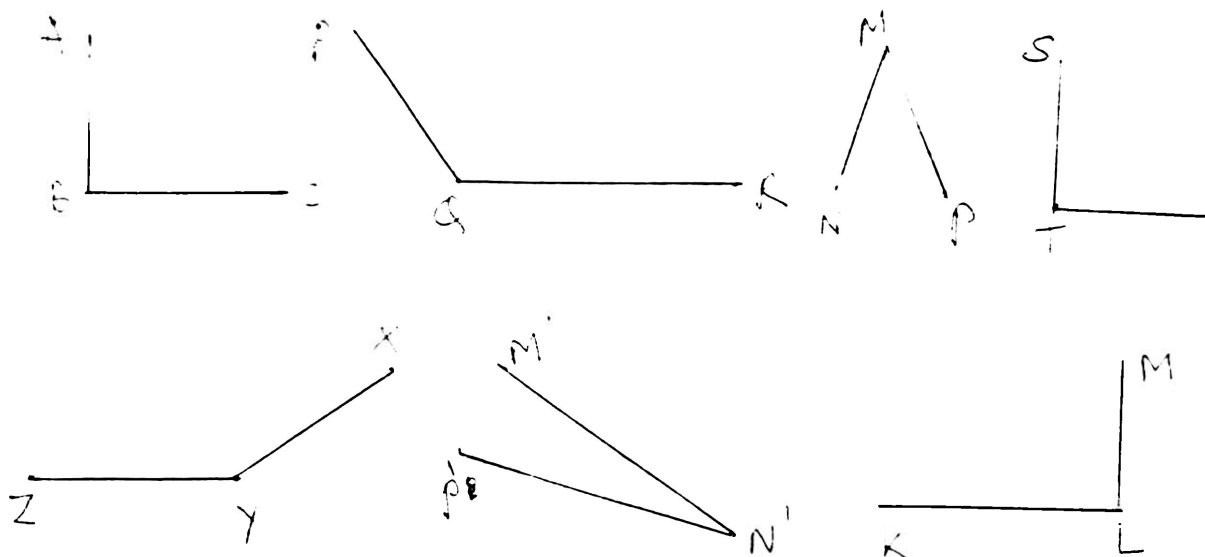
Which of them has more widely spread out arms ? First one ? or the second ? \_\_\_\_\_

The angle with wider spread between its arms is called the larger angle.

Now you can say which of the two angles above is the larger one, can't you ? \_\_\_\_\_

Compare each angle given below with  $\angle ABC$  and find out whether larger than, smaller than or equal to  $\angle ABC$ . Then fill up the table.

Equal to $\angle ABC$	Larger than $\angle ABC$	Smaller than $\angle ABC$



## Measurement of the Angles

You already know how to measure the length and breadth, and draw.

Now we are going to learn how to measure the spread of an angle.

Look at the picture.

Haven't you seen this tool in your instrument box ?

Do you know its name ?

Protractor

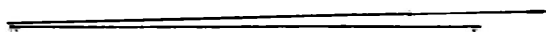
'O' is the centre of the protractor.

MN is the baseline of the protractor.

Don't you see small markings on its curved edge ?

Suppose we join two adjacent markings to the centre of the protractor.

We will get a very small angle. don't we ? One such angle is shown below.

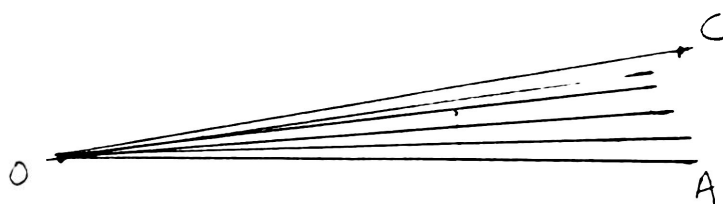


The spread of this angle is taken as the unit to measure the spread of angles.

The spread of this angle is called one degree.

To find the spread of an angle, we see how many degree joined together make the spread.

See the picture below.



How many angles of one degree are joined to form ABC ?

We can say that the measures of the angle ABC is 5 degrees.

Symbol  $0^\circ$  is used to represent the degree.

How can we write the measure of ABC ?

We can write the measure of ABC =  $5^\circ$

$$\text{or } \angle ABC = 5^\circ$$

Now let's see how we can measure an angle using a protractor.

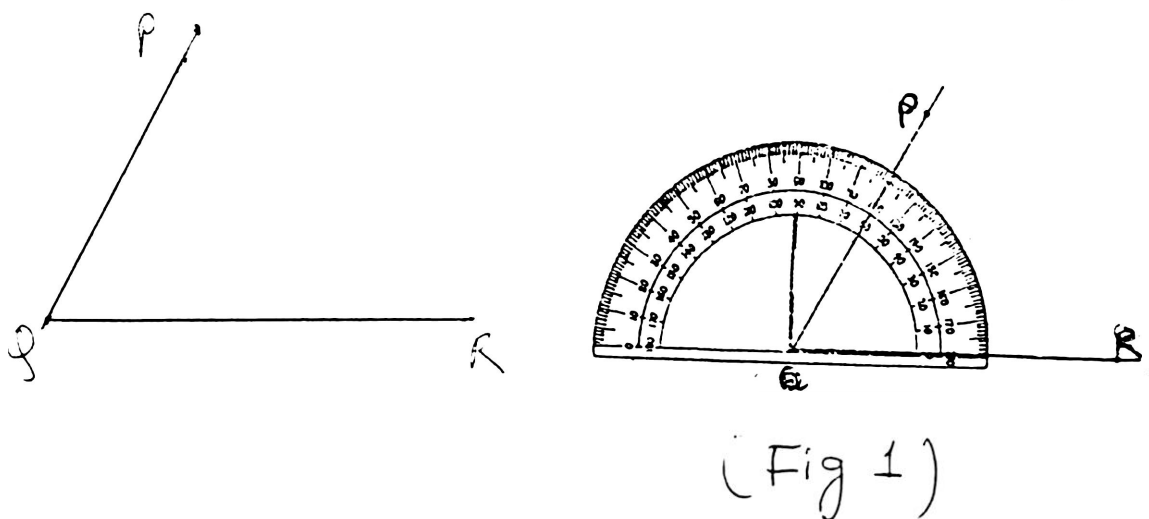
**Step 1:** Place the protractor on the angle to be measured.

**Step 2:** The centre of the protractor should be on the vertex.

**Step 3:** The baseline of the protractor should be placed over one arm of the angle.

**Step 4:** Then count the small marking on its (protractor) curved edge upto other arm of the angle.

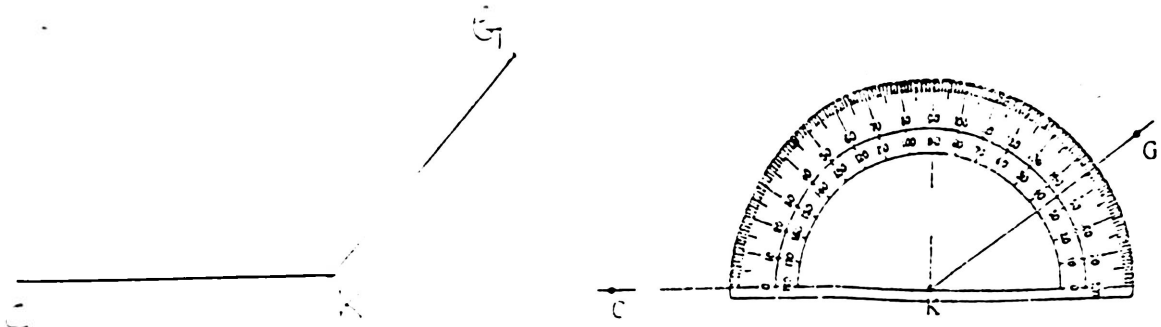
$\therefore$  The measure of the angle = Total number of small markings.



Place the protractor on the angle to be measured. Centre of protractor is on the vertex, i.e. at 'Q'. Baseline of the protractor is

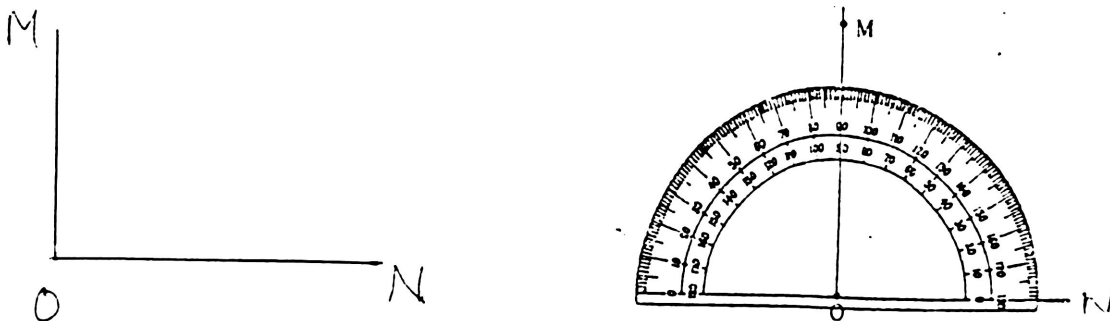
placed over the arm QR. Can you see the other arm QP. See the number on the arm QR. It is 60. Isn't it ? Yes.

That means  $\angle PQR = 60^\circ$



(Fig 2)

Measure the angles given above and below.



(Fig 3)

Draw some angles on your notebook and measure the angles.

## Different Types of Angles

Now you are familiar with how to measure the angle using protractor. Now we are going to discuss about the different types of angles. In the previous page, there are three figures. You measure these angles. Did you find any difference ?

You measured (figure 3) this angle.



What did you get ?  $\angle MON = 90^\circ$

The angles which have measure  $90^\circ$  have a name called right angles.

Compare the right angle MON and the angle shown in the Figure 2.

Which is the big one ? Figure 2.

Is its measure less than or greater than right angle MON ?

It is greater than right angle MON.

$\therefore$  Angles of measure greater than  $90^\circ$  are called obtuse angles.

$\therefore$  We call the angle in Fig. 2 as obtuse angle.

Compare Fig. 1 and Fig. 2.

Which is the small one ? Fig. 1.

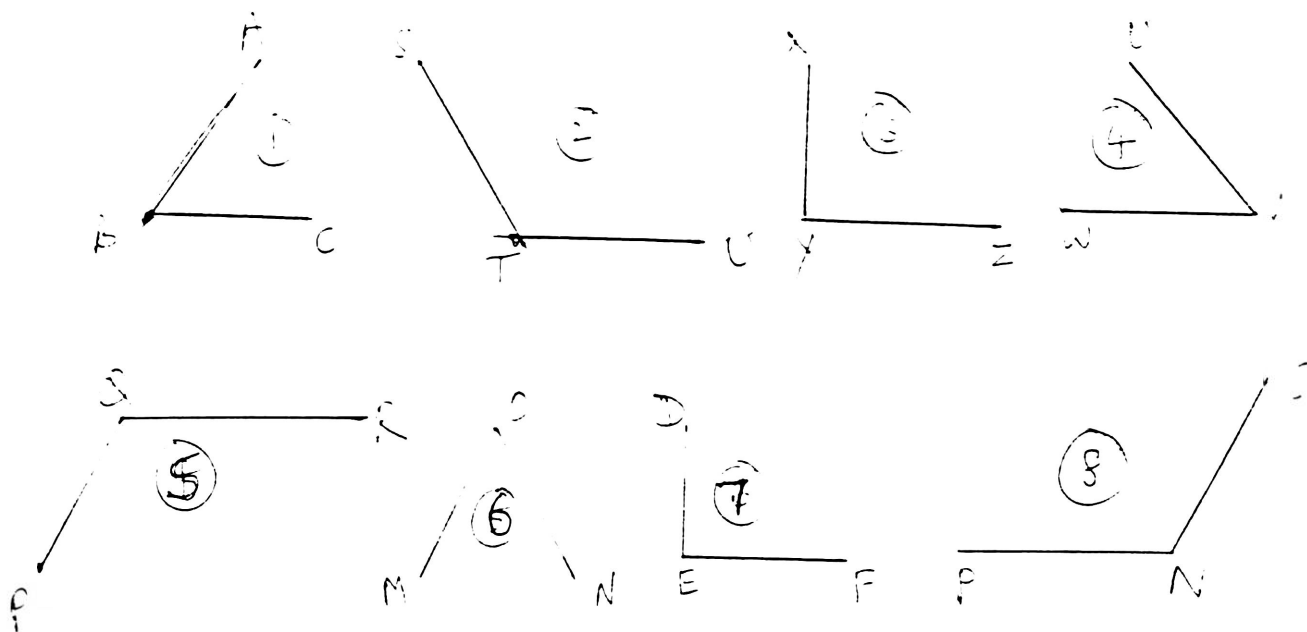
Is Fig. 2 measure less than or greater than right angle MON.

It is less than right angle MON.

$\therefore$  Angle of measure less than  $90^\circ$  are called acute angles.



∴ We call it as acute angle.



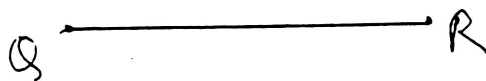
Right angle	Acute angle	Obtuse angle

Measure the angles given above. Separate them into right angles, acute angles and obtuse angles and fill up the tables.

### To draw an angle of a given measure

Suppose we want to draw an angle of measure  $30^\circ$ . How do we do it ?  $\angle PQR = 30^\circ$

First let us draw one arm.



Place the centre of protractor on 'R' and the base line over QR.

Mark 'R' a point on the second arm, which indicate  $30^\circ$  (see fig.)

Remove the protractor and draw the line joining 'O' and the new point 'P'.

It is the second arm.

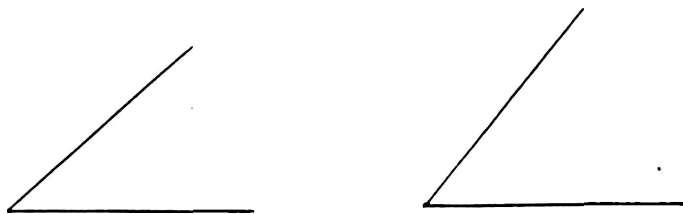
Now you can draw angles in your notebook with measures given below.

$45^\circ$ ,  $65^\circ$ ,  $148^\circ$ ,  $127^\circ$ ,  $37^\circ$ ,  $25^\circ$ ,  $135^\circ$ ,  $110^\circ$ ,  $90^\circ$

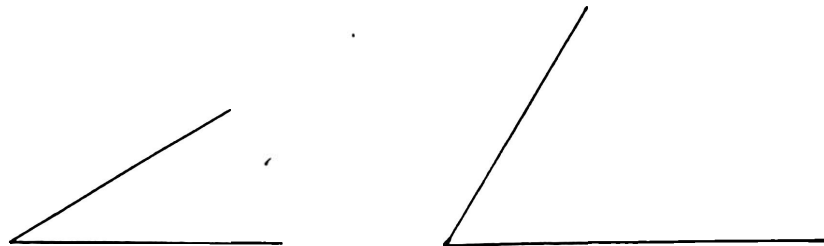
### Complementary and Supplementary Angles

The picture below shows five pairs of angles. Measure the angles of each pair and write the measures in the table.

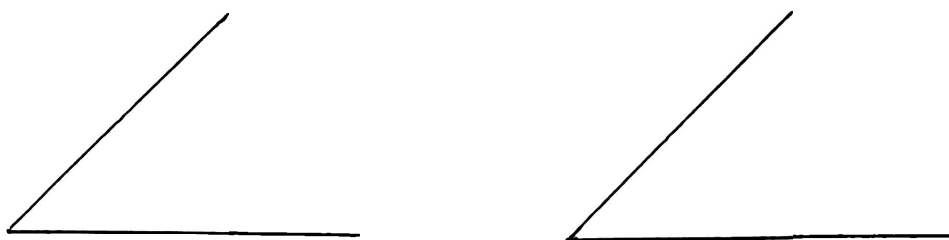
**Pair 1**



**Pair 2**



**Pair 3**



	Measure of $\angle 1$	Measure of $\angle 2$	Sum
Pair 1			
Pair 2			
Pair 3			

Have you found the sum of the measures of each pair ?

What did you get ?

Every sum is  $90^\circ$ , isn't it ?

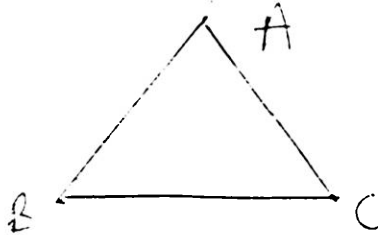
If the sum of the measures of two angles is  $90^\circ$ , then they are called complementary angles.

Like that, if the sum of the measures of two angles is  $180^\circ$ , then they are called supplementary angles.

### Triangles

Look at the picture.

What is it ?



It is a triangle, isn't it ?

Which are the vertices of triangle ?

Can you say how many angles are there in a triangle. (3)

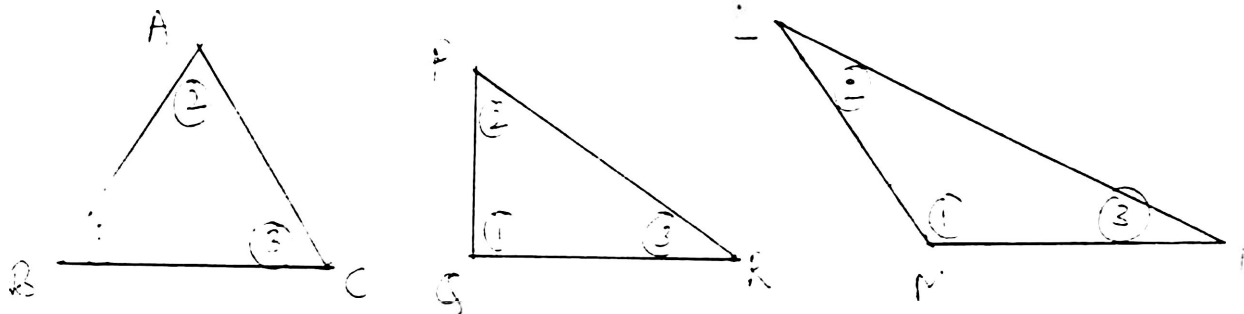
What is the angle made by the sides AB and AC ?

It is  $\angle BAC$ , isn't it ?

What is the angle made by AB and BC ?

What about BC and CA ?

Write the names and measure the angles of each triangle below and fill up the table.



Name of the triangle	Measures of the angles			Sum
	1	2	3	
ABC				
PQR				
LMN				

What do you understand from the table.

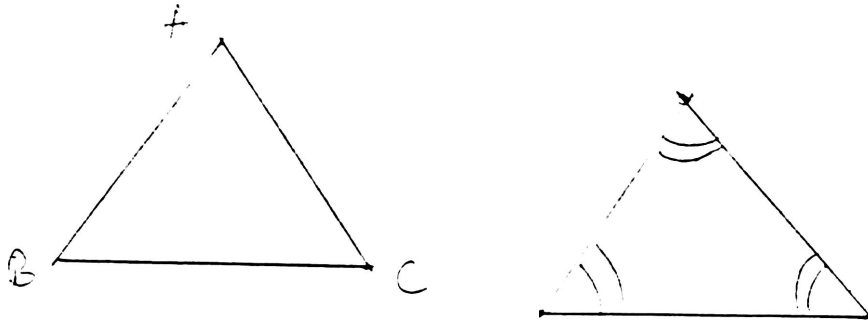
The sum of the angles in a triangle is  $180^\circ$ .

## Suggested Activity

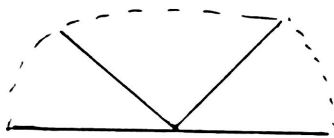
### An Experiment

You can prove it by conducting an experiment.

Cut out a paper triangle and then cut out three pieces as shown in the figure.



Place them together.



It is the shape of an half circle, isn't ?

That means it looks like a protractor.

From this what can you conclude about the sum of the angles of a triangle ?

# CHAPTER V

## MORE ABOUT FRACTIONS

### Concepts

5.1 Multiplication of a fraction by a counting number

5.2 Multiplication of a fraction by a fraction

5.3 Dividing a fraction by a counting number

5.4 Finding the reciprocal of a fraction

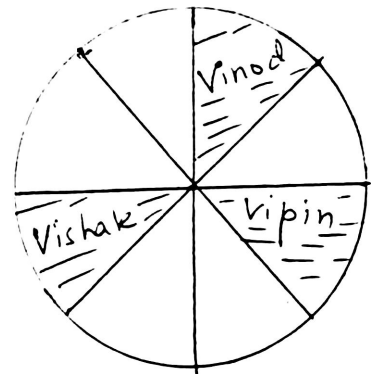
5.5 Dividing a fraction by a fraction

5.6 Dividing a counting number by a fraction

5.7 Simplifying expressions involving fractions

### 5.1 Multiplication

Vinod, Vishak and Vipin share a cake. The picture show their shares. What part of the cake do they get together ?



How many pieces are in total = 8

What part of the whole does Vinod get ?  $\frac{1}{8}$

What part of the whole does Vishak get ?  $\frac{1}{8}$

What part of the whole does Vipin get ?  $\frac{1}{8}$

What part of the whole does they together get ?

$$1/8 + 1/8 + 1/8 = (1+1+1)/8 = 3/8$$

How can we write  $1/8 + 1/8 + 1/8$  in another way ?

3 times  $1/8$

What is it equal to ?

$$3 \times 1/8$$

$$\text{Is } 1/8 + 1/8 + 1/8 = 3 \times 1/8 \text{ ?}$$

Yes

$$\text{or } 3/8 = 3(1/8)$$

$$\text{or } 3 \times (1/8) = 3/8$$

Arun, Athul, Ajnas, Akash, Anil share a chocolate bar in the following way.

What part of the bar the four friends get together ?

Arun	Ajnas	Anil	
Athul	Akash		

How many equal parts are there ?      8

What fraction is given to each one ?       $1/8$

How many  $1/8$  's are shared 5 ?

What part of the whole is together they get ?

$$1/8 + 1/8 + 1/8 + 1/8 + 1/8 = 5/8$$

Five  $1/8$  can be written as

$$5 \times (1/8) = 5/8$$

## Exercises

Using the above two examples fill up the following.

$$3 \times (1/8) = 3/8$$

$$5 \times (1/8) = 5/8$$

$$3 \times (1/5) = \frac{3}{5}$$

$$6 \times (1/7) = \frac{6}{7}$$

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

From the above table it is clear that

Counting number  $\times$  Fraction

$$= \frac{\text{Counting number} \times \text{Numerator of the fraction}}{\text{Denominator of the fraction}}$$

## Suggested Activity

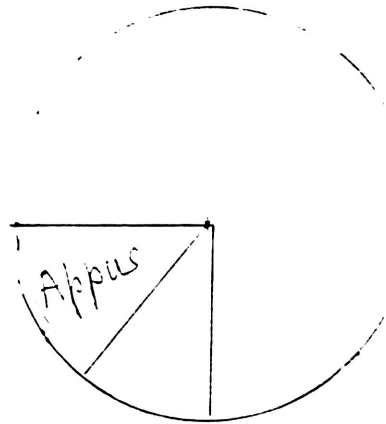
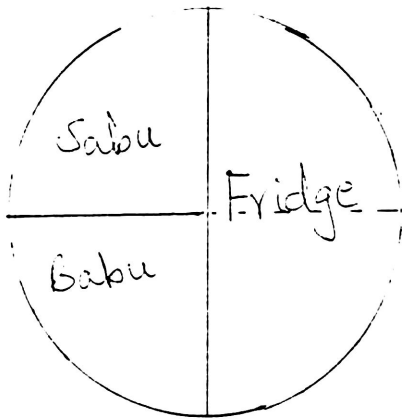
- 1 km is equal to  $5/8$  of a mile. How many miles are equal to 20 km ?
2. Vini scored 80 marks in mathematics. Suny scored  $1/4$  of his mark. How many marks did Suny score ?

## 5.2 Example 1

Babu's father had bought a cake. Mother cut it into two equal parts. Kept one piece in the refrigerator and the other shared equally to her two sons Babu and Sabu. Then Appus, a small neighbouring boy came there. Babu gave half of his share to Appus. Can you find what part of the total will get Appus ?



Draw the figure of the cake roughly.



How many equal parts are there ? 4

What part of the whole kept in the refrigerator ?  $\frac{2}{4}$  or half or  $\frac{1}{2}$

What part of the whole does Babu get ?  $\frac{1}{4}$

What part of the whole does Appus get ? half of  $\frac{1}{4}$

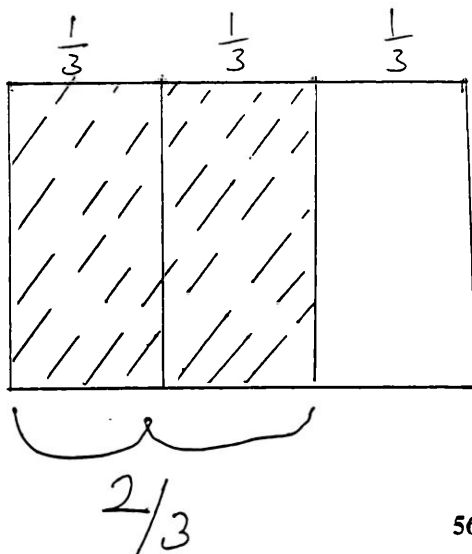
From the figure it is  $\frac{1}{8}$  portion, that is half of  $\frac{1}{4} = \frac{1}{8}$

or  $\frac{1}{2}$  or  $\frac{1}{4} = \frac{1}{8}$

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

## Example 2

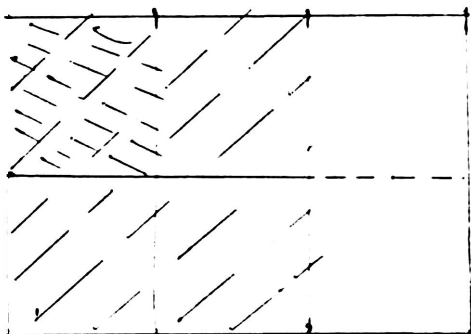
Find  $\frac{1}{4}$  of  $\frac{2}{3}$  or  $\frac{1}{4} \times \frac{2}{3}$



The total shaded portion is  $\frac{2}{3}$ .

We want to find  $\frac{1}{4}$  of  $\frac{2}{3}$ .

Divide  $\frac{2}{3}$  portion into four parts and take one part from it.



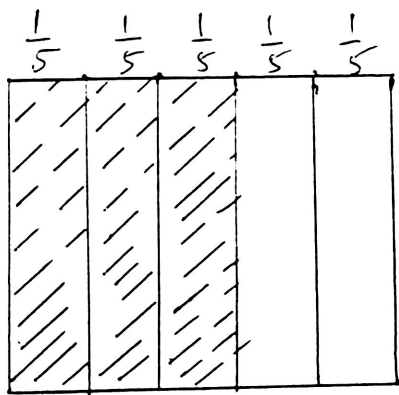
The double shaded portion is  $\frac{1}{4}$  of  $\frac{2}{3}$ .

What part of the whole is double shaded ?  $\frac{1}{6}$

$$\frac{1}{4} \times \frac{2}{3} = \frac{2}{12} = \frac{1}{6}$$

### Example 3

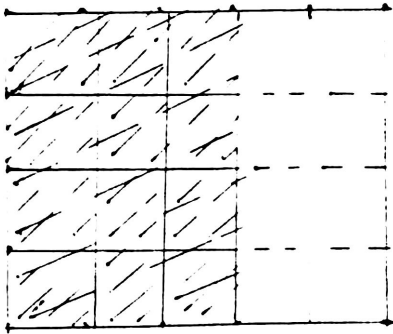
From  $\frac{3}{4}$  part of  $\frac{3}{5}$  or  $\frac{3}{4} \times \frac{3}{5}$



What the shaded portion represent ?      $\frac{3}{5}$

To get  $\frac{3}{4}$  of  $\frac{3}{5}$  what should be done first ?

Divide  $\frac{3}{5}$  into 4 equal parts and then take 3 parts from it.



Then what is the double shaded portion represents  $\frac{3}{4}$  of  $\frac{3}{5}$

What part of the whole is it ?      $\frac{9}{20}$

$$\therefore \frac{3}{4} \times \frac{3}{5} = \frac{9}{20}$$

Write the answers of the above three examples.

(1)  $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$

(2)  $\frac{1}{4} \times \frac{2}{3} = \frac{2}{12}$

(3)  $\frac{3}{4} \times \frac{3}{5} = \frac{9}{20}$

### Exercises

Examine the above answers fill in the blanks.

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

(2)  $\frac{9}{16} \times \frac{4}{5} =$

(3)  $\frac{5}{8} \times \frac{3}{7} =$

### Example 4

(1)  $6 \times 2\frac{1}{2}$

$$6 \times \frac{(2 \times 2) + 1}{2} = 6 \times \frac{5}{2}$$

$$= \frac{30}{2}$$

### Example 2

$7\frac{1}{2} \times 5\frac{1}{2}$

$$7\frac{1}{2} = \frac{(7 \times 2) + 1}{2} = \frac{15}{2}$$

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

$$\therefore 7\frac{1}{2} \times 5\frac{1}{2} = \frac{15}{2} \times \frac{11}{2} = \frac{165}{4}$$

### Exercises

1. A rectangular table is  $\frac{2}{3}$  metre breadth and  $\frac{7}{8}$  metre length.

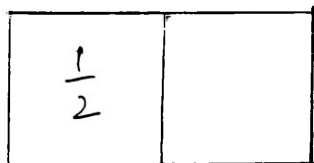
Find its area (Area = l x b).

2.  $\frac{1}{5}$  part of  $\frac{1}{6}$  part of a sheet of paper is coloured. What fraction of the whole paper is coloured ?

### 5.3 Example 1

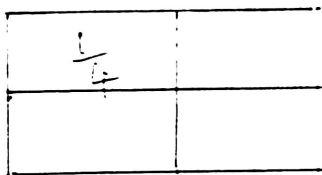
Find  $\frac{1}{2} \div 2$

Take a piece of paper. Fold it into two equal parts



What is the fraction denoted by each part ?  $\frac{1}{2}$

Again fold the paper into two equal parts as in the figure.



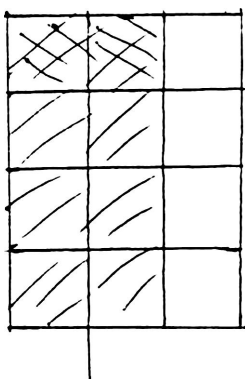
What part of the total is each piece now ?  $\frac{1}{4}$

When we divide  $\frac{1}{2}$  into two equal parts we get  $\frac{1}{4}$ .

i.e.  $\frac{1}{2} \div 2 = \frac{1}{4}$

### Example 2

Find  $\frac{2}{3} \div 4$



Shaded portion represents what fraction.  $\frac{2}{3}$

Divide that portion into 4 equal parts. Take one part from it and shade again.

What the double shaded part represent ?

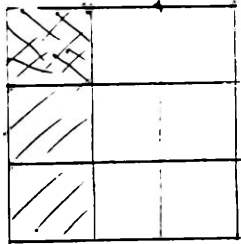
$$2/3 \div 4$$

The fraction denoted by the double shaded portion =  $2/12$

i.e.  $2/3 \div 4 = 2/12$

### Example 3

Find  $1/3 \div 3$



What fraction denoted by the shaded portion ?  $1/3$

Divide that shaded portion into three equal parts.

Take one portion from it and again shade it.

What fraction denoted by the double shaded portion ?  $1/9$

$$1/3 \div 3 = 1/9$$

Examine the first three answers and fill up the blank spaces below.

(1)  $1/2 \div 2 = 1/4$

(2)  $2/3 \div 4 = 2/12$

(3)  $1/3 \div 3 = 1/9$

(4)  $2/5 \div 3 = \quad /15$

(5)  $5/3 \div 2 = 5/$

(6)  $4/11 \div 3 = \quad /$

(7)  $3/7 \div 6 = \quad /$

**Exercises**

- 1.  $1/3$  litre of lime juice is poured equally into 4 glasses. What is the amount of juice per glass ?
- 2.  $4 \frac{1}{2}$  kg of rice is distributed to 9 persons. What is the average weight of rice each one get ?

5.4 We know that every counting number can be written in the form of a fraction having denominator.

For example  $3 = 3/1$

$5 = 5/1$ , etc.

Reciprocal of a fraction is obtained by interchanging the numerator and denominator.

**Example**

Number	Reciprocal
$2/3$	$3/2$
$5/6$	$6/5$
$8/9$	$9/8$
3	$1/3$
5	$1/5$

Fill in the blanks.

$2 \times 3 = 6$

$6 \div 3 = 2$

$$4 \times 3 = 12$$

$$12 \div 4 = 3$$

$$5 \times 6 = 30$$

$$30 \div 6 =$$

$$8 \times 3 = 24$$

$$24 \div 8 =$$

$$2 \times (1/3) = 2/3$$

$$2/3 \div 1/3 = 2$$

$$5 \times (3/8) = 15/8$$

$$15/8 \div 3/8 =$$

$$7 \times (4/9) = 28/9$$

$$28/9 \div 4/9 =$$

Examine the above examples. Can you find a similarity ?

$$2/3 \div 1/3 = 2$$

$$2/3 \times \text{reciprocal of } 1/3 =$$

$$2/3 \times 3 = 6/3 = 2$$

$$15/8 \div 3/8 = 5$$

$$15/8 \times \text{reciprocal of } 3/8$$

$$= 15/8 \times 8/3 = 5$$

$$28/9 \div 4/9 = 7$$

$$28/9 \times \text{reciprocal of } 4/9$$

$$28/9 \times 9/4 = 7$$

$$16/15 \div 2/15 = 8$$

$$16/15 \times 15/2 =$$

From the above example it can be seen that whenever divisions takes place in case of fractions, instead of division, multiply with the reciprocal of the divisor.

It can be true for counting numbers and fractions.

### Example

$$3/4 \div 2 = 3/4 \times 1/2$$

$$2 \frac{1}{2} \div 4 \frac{1}{3} = 5/2 \div 13/3$$

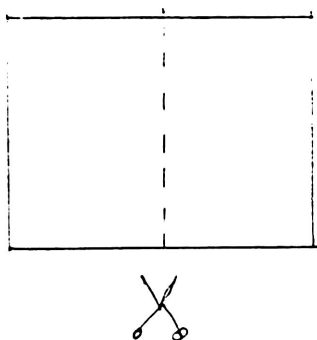
$$= 5/2 \times 3/13 = 15/26$$



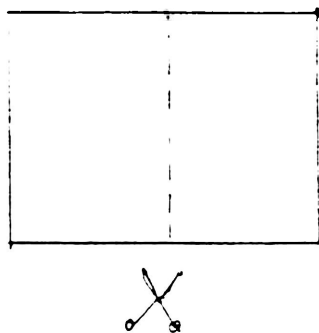
## 5.6 Example 1

See the picture of the following paper cutting. A and B are of same size.

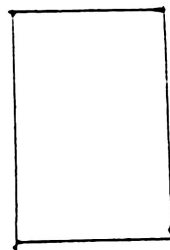
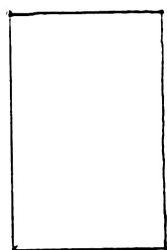
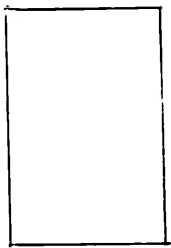
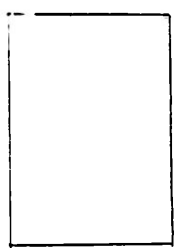
A



B



Cut the two papers equally into half or  $\frac{1}{2}$ .



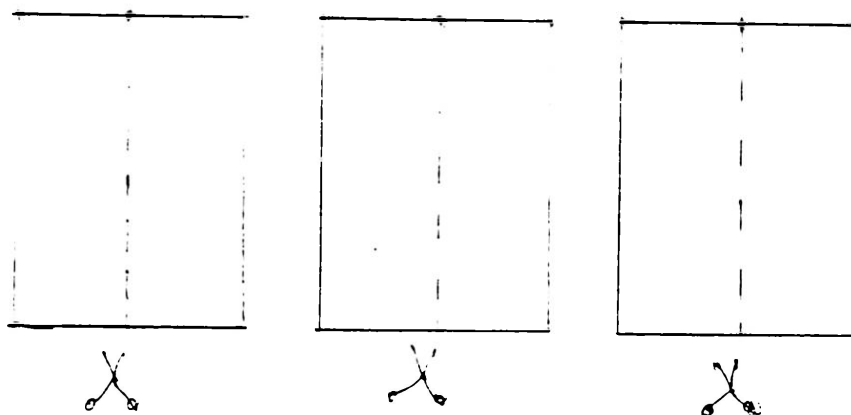
Here we get four pieces.

We divide two papers into half.

Or divide it into  $\frac{1}{2}$ .

$$\text{Or } 2 \div \frac{1}{2} = 4$$

### Example 2

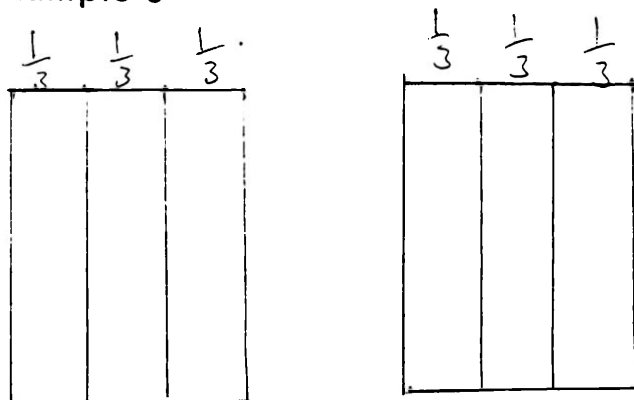


When you divide 3 papers how many  $\frac{1}{2}$  's you get ?

6

$$\text{So } 3 \div \frac{1}{2} = 6$$

### Example 3



Divide 2 papers into 3 parts. Then totally how many  $\frac{1}{3}$  parts you get ?      6

Then how can we conclude ?

$$2 \div \frac{1}{3} = 6$$

From the above three examples, we get

$$2 \div \frac{1}{2} = 4 \quad 2 \times \text{reciprocal of } \frac{1}{2} = 2 \times (2/1) = 4$$

$$3 \div \frac{1}{2} = 6 \quad 3 \times \text{reciprocal of } \frac{1}{2} = 6$$

$$2 \div \frac{1}{3} = 6 \quad 2 \times \text{reciprocal of } \frac{1}{3} = 2 \times (3/1) = 6$$

From these examples in this case also, like earlier, division is possible by multiplying the dividend by the reciprocal of the divisor.

### Exercises

$$(1) 20 \div \frac{1}{4} = 20 \times (4/1) = 80$$

$$(2) 40 \div (3/7) = 40 \times ( \quad / 3 ) =$$

$$(3) 23 \div (2/3) = 23 \times ( \quad / \quad ) =$$

$$(4) 17 \div (11/21) =$$

$$(5) 13 \div (8/9) =$$

$$(6) 22 \div (7/9) =$$

$$(7) 13 \div (9/2) =$$

5.7 We know  $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \dots\dots$

$$\therefore \frac{2}{4} = \frac{3}{6} = \frac{1}{2}$$

i.e.  $\frac{2}{4}$ ,  $\frac{3}{6}$ ,  $\frac{4}{8} = \dots$  can be written as  $\frac{1}{2}$  in a simple way.

Similarly,

$$1/3 = 2/6 = 3/9 = 4/12 = 5/15 = \dots\dots$$

So 2/6, 3/9, 4/12, 5/15 can be written as 1/3.

### Example

Write 4/20 in the simplest form.

$$\frac{4}{20} = \frac{1 \times 4}{5 \times 4} = \frac{1}{5} \times \frac{4}{4}$$

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

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

$$\therefore \frac{4}{20} = \frac{1}{5}$$

### Example 2

Write 3/12 in the simplest form.

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

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

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

### Example 3

$$\frac{8}{14} = \frac{4 \times 2}{7 \times 2} = \frac{4}{7} \times \frac{2}{2}$$

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

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

$$\frac{4}{20} = \frac{1}{5} \quad \text{or} \quad \frac{4 \div 4}{20 \div 4} = \frac{1}{5}$$

$$\frac{3}{12} = \frac{1}{4} \quad \text{or} \quad \frac{3 \div 3}{12 \div 3} = \frac{1}{4}$$

$$\frac{8}{14} = \frac{4}{7} \quad \text{or} \quad \frac{8 \div 2}{14 \div 2} = \frac{4}{7}$$

To get the simplest form, divide the numerator and denominator by the same number namely HCF.

### Exercises

Write in the simplest form.

(1)  $\frac{12}{36}$

(2)  $\frac{33}{55}$

(3)  $\frac{60}{70}$

(4)  $\frac{45}{60}$

(5)  $\frac{28}{56}$

(6)  $\frac{22}{77}$

### Example 1

Find the product of  $\frac{5}{12} \times \frac{6}{10}$

$$= \frac{5}{10} \times \frac{6}{12}$$

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

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

### Example 2

$$\frac{8}{15} \div \frac{12}{7}$$

$$= \frac{8}{15} \times \frac{7}{12}$$

$$= \frac{8}{12} \times \frac{7}{15}$$

$$= \frac{2}{3} \times \frac{7}{15}$$

$$= \frac{14}{45}$$

### Example

(1) Find  $\frac{8}{12} \times \frac{18}{5}$

(2)  $\frac{6}{15} \times \frac{10}{7} \times \frac{28}{18}$

### Exercises

(1)  $\frac{8}{15} \div \frac{12}{7}$

(2)  $\frac{3}{16} \div \frac{2}{4}$

(3)  $\frac{22}{28} \times ((\frac{20}{66} \div \frac{10}{6}))$

Four bags of rice contain  $252 \frac{1}{3}$  kg. If all the bags contain equal quantity of rice, find the quantity of rice contained in each one of them.

## CHAPTER VI

### DECIMALS

#### Concepts

- 6.1 Multiplication of a decimal by a counting number.
- 6.2 Quick multiplication of a decimal by 10, 100 and 1000.
- 6.3 Division of a decimal by a counting number.
- 6.4 Quick division of a decimal by 10, 100 and 1000.
- 6.5 Multiplication of two decimals.
- 6.6 Division of two counting numbers and write it in the form of decimals.
- 6.7 Division of a decimal by a decimal.
- 6.8 Finding the decimal form of any given fraction.
- 6.9 Introduction of recurring decimals.

You are already familiar with decimals in 5<sup>th</sup> standard you know how to express as a fractions with denominations 10, 100, 1000, etc. in decimal form too. You also know the place value of the digits in decimals and how to add and subtract decimals. In this lesson we consider multiplication and division of decimals.

Before that, what do you know a mean by Rs. 6.25 ?

Rs. 6.25 means 6 rupees and 25 paise. How many paise make a rupee ? 100 so what part of a rupee is 25 paise ?  $\frac{25}{100}$  Then, how do we write  $\frac{25}{100}$  as a decimal 0.25 ? Now complete the following table below.

15 rupees 20 paise	40 rupees 35 paise	81 rupees 50 paise	210 rupees 10 paise	500 rupees 5 paise
Rs. 15.20	-	-	-	-

6.1 Suresh wants to buy 4 chocolates. If one chocolate costs 50 paise, what will be the cost of 4 chocolates ?

Let us see, the cost of one chocolate = 50 paise

$$\begin{aligned}
 \text{So the cost of 4 chocolate} &= 50 \times 4 \\
 &= 200 \text{ paise} \\
 &= \text{Rs. } 2
 \end{aligned}$$

If we change 50 paise into rupees and then multiply by 4.

50 paise = 0.50 Rs.

$$\begin{aligned}
 \text{So the cost of 4 chocolate} &= 0.50 \times 4 \\
 &= 0.50 + 0.50 + 0.50 + 0.50 \\
 &= \text{Rs. } 2.00
 \end{aligned}$$

We get the same answer, don't we ? Now if Suresh wants 8 chocolates, what will be the cost ?

$$\begin{aligned}
 \text{The cost of 8 chocolate} &= 50 \times 8 \\
 &= 400 \text{ paise} \\
 &= \text{Rs. } 4
 \end{aligned}$$

If we change to rupees and multiply by 8, the cost =  $0.50 \times 8$

$$\begin{aligned}
 &= 0.50 + 0.50 + 0.50 + 0.50 + 0.50 + 0.50 + 0.50 + 0.50 \\
 &= \text{Rs. } 4.00
 \end{aligned}$$



Now you can easily find the cost of any number of chocolates.

Number of chocolates	Total cost
10	$0.50 \times 10 = 5$
25	$0.50 \times 25 = \_\_\_\_\_\_$
50	$0.50 \times 50 = \_\_\_\_\_\_$

### E.g. II

The price of one pencil is 2.50 Rs. Rama bought 7 pencils.

How much does he need to pay ?

The price of one pencil = 2.50 Rs.

The price of 7 pencils =  $2.50 \times 7$   
= 17.50 Rs.

We can do this in another way

Rs. 2.50 = 2 rupees 50 paise  
= 250 paise

The price of 7 pencils =  $250 \times 7$   
= 1750 paise  
= 17 rupees 50 paise  
= Rs. 17.50

Now fill up the following table.

Price of one thing	Number of things	Total price (Rs)
Rs. 6.45	7	$6.45 \times 7 = \_\_\_\_\_\_$
Rs. 8.35	6	$8.35 \times 6 = \_\_\_\_\_\_$
Rs. 9.80	4	$9.80 \times 4 = \_\_\_\_\_\_$
Rs. 15.75	11	$15.75 \times 11 = \_\_\_\_\_\_$
Rs. 23.85	5	$25.85 \times 5 = \_\_\_\_\_\_$

### E.g. 3

If one bag contains 0.756 kg of tea leaves, what will be the weight of 3 such bags ?

Here we have to find the weight of 3 bags.

Weight of one bag = 0.756 kg

$$\begin{aligned}\therefore \text{Weight of 3 bags} &= 0.756 \times 3 \\ &= 2.268 \text{ kg}\end{aligned}$$

Let us do it is another method.

Let us change kg into grams.

We know

$$1 \text{ kg} = 1000 \text{ gm}$$

$$\begin{aligned}\therefore 0.756 \text{ kg} &= 756 \times 1000 \text{ gm} \\ &= 756 \text{ gms}\end{aligned}$$

Hence,

$$\text{Weight of one bag} = 0.756 \text{ kg} = 756 \text{ gms}$$

$$\begin{aligned}\therefore \text{Weight of 3 bags} &= 756 \times 3 \\ &= 2268 \text{ gms}\end{aligned}$$

But you know

$$2268 \text{ gms} = 2.268 \text{ kg}$$

Now fill up the following table.

The weight of one packet	Number of packets	Total weight	Calculation	Answer
0.135 kg	9	$0.135 \times 9$	$135 \times 9$	1.215 kg
0.678 kg	5	-	-	-
3.125 kg	3	-	-	-
7.775 kg	8	-	-	-
12.075 kg	2	-	-	-

### Example 1

The milk required for a family for a week is 12.5 l. How much milk do they require in 4 weeks ? Let us see,

For one week, required quantity of milk = 12.5 l

$\therefore$  For 4 weeks, required quantity of milk =  $12.5 \times 4$

$$= 12.5 + 12.5 + 12.5 + 12.5$$

$$= 50 \text{ l}$$

Now we are changing it into mls.

Milk require for 1 week = 12.5 l

$$= 12 \text{ l } 500 \text{ ml}$$

$$= 12500 \text{ ml}$$

Milk require for 4 weeks =  $12500 \times 4$

$$= 50000 \text{ ml}$$

$$= 50 \text{ l}$$

Now fill up the following table.

Quantity of milk	Number of weeks	Total quantity
0.4 l	3	1.2 l
0.075 l	15	-
1.125 l	5	-
2.250 l	11	-

6.2 You know the multiplication of whole numbers with 10, 100, 1000, etc. in an easy way. For example

$$34 \times 10 = 340$$

$$88 \times 100 = 8800$$

$$74 \times 1000 = 74000$$

Now we have to multiply a decimal with 10, 100, 1000, etc. in a similar way. For example we have to multiply 0.5 by 10.

We know  $10 \times 5 = 50$

But the given number has one digit after the decimal place. So put decimal after one place from right.

Now  $10 \times 0.5 = 5.0$

### Example 2

$$0.04 \times 100 = 4 \times 100 = 4.00$$

### Example 3

$$1.5 \times 1000 = 1500.0$$

Fill up the table given below.

$0.375 \times 10$	$375 \times 10 = 3750$	$0.375 \times 10 = 3.750$
$2.35 \times 10$		
$0.82 \times 100$		
$4.365 \times 100$		
$0.7 \times 1000$		
$5.217 \times 1000$		

Now can you find the products below without any calculation ?

$$4.803 \times 10 = \text{-----} \quad 80.051 \times 10 = \text{-----}$$

$$4.803 \times 100 = \text{-----} \quad 80.051 \times 100 = \text{-----}$$

$$4.803 \times 1000 = \text{-----} \quad 80.051 \times 1000 = \text{-----}$$

Now can you complete the following ?

1. The easy way to multiply a decimal number by 10 is -----.
2. The easy way to multiply a decimal number by 100 is -----.
3. The easy way to multiply a decimal number by 1000 is -----.

6.3 You know how to divide a natural number by another natural number.

For e.g.  $6 \div 3 = 2$

But how will you divide a decimal number by a natural number. Let us do some examples on it.

E.g.: (1) Rita, Sita, Neethar, are three sisters. They bought 9.63 metres of ribbon. They had to divide it equally among themselves.

How long a piece did each girl get ?

Here, we have to divide 9.63 by 3.

9.63 metres = 9 metres and 63 centimetres

9 metres = 900 centimetres

9 metres 63 centimetres = 900 + 63 centimetres

= 963 centimetres

∴ The length of ribbon one got =  $963 \div 3$

= 321

= 321 centimetres

= 3 metres 21 centimetres

= 3.21 metres

Let us do it in another way ?

Length of ribbon one got =  $9.63 \div 3$

= 3 metres 21 centimetres

= 3.21 metres

**E.g.(2)** Rama has 0.725 litres of milk in a bottle. He has to divide it into five cups. Then how much milk is there in each cup ? Here we have to divide 0.725 litre of milk into five equal parts.

0.725 litres =  $0.725 \times 1000$  millilitres

= 725 millilitres

So it is enough if we divide 725 millilitres into 5 equal parts.

$725 \div 5 = 145$

145 millilitres = 0.145 litres

So each cup contains 0.145 litres of milk.

Now fill up the following table.

Division	Calculation	Quotient
$44.50 \div 2$	$4450 \div 2 = 2225$	$44.50 \div 2 = 22.25$
$15.27 \div 3$		
$48.66 \div 6$		
$56.32 \div 8$		
$0.6477 \div 3$		

6.4 Here we introduce the easy way to divide a decimal by 10, 100 or 1000.

For e.g. (1) Divide 0.2 by 10

$$0.2 \div = 0.02$$

$$(2) 5.4 \div 100 = 0.054$$

$$(3) 82.5 \div 1000 = 0.0825$$

From it can you say an easy method for dividing a decimal number by 10, 100, 1000, i.e. to divide a decimal number by 10, 100, 1000, put the decimal to the left by as many places as there are zeros in the divisor.

Now fill up the following table without actually doing the division.

Division by 10	$84.5 \div 10 = 8.45$	$2.44 \div 10 = \underline{\hspace{2cm}}$	$72.8 \div 10 = \underline{\hspace{2cm}}$	$.612 \div 10 = \underline{\hspace{2cm}}$	$32.1 \div 10 = \underline{\hspace{2cm}}$
Division by 100	$0.45 \div 100 = \underline{\hspace{2cm}}$	$243.7 \div 100 = \underline{\hspace{2cm}}$	$2.85 \div 100 = \underline{\hspace{2cm}}$	$4.2 \div 100 = \underline{\hspace{2cm}}$	$27 \div 100 = \underline{\hspace{2cm}}$
Division by 1000	$0.5 \div 1000 = \underline{\hspace{2cm}}$	$2315 \div 1000 = \underline{\hspace{2cm}}$	$9.4 \div 1000 = \underline{\hspace{2cm}}$	$4 \div 1000 = \underline{\hspace{2cm}}$	$0.08 \div 1000 = \underline{\hspace{2cm}}$

6.5 Here we are discussing the multiplication of one decimal by another.

E.g.(1) Suppose you have to multiply 0.3 by 0.2, i.e.  $0.3 \times 0.2$

For it first of all you remove the decimals then it become,  $3 \times 2 = 6$

Now find the total decimal places in the two given numbers, here it is 2.

Then is 6, put decimal after two paces from right, i.e. 0.06, which is the answer, i.e.  $0.3 \times 0.2 = 0.06$

E.g.(2)  $3.2 \times 44.1 =$

$$32 \times 441 = 14112$$

$$3.2 \times 44.1 = 141.12$$

Now write the easy method for finding the product of two decimal numbers.

Fill the table given below.

$6 \times 164 = 984$	$0.6 \times 16.4 = 9.84$
$25 \times 160 = \underline{\hspace{2cm}}$	$0.25 \times 1.66 = \underline{\hspace{2cm}}$
$15 \times 35 = \underline{\hspace{2cm}}$	$1.5 \times 0.35 = \underline{\hspace{2cm}}$
$25 \times 448 = \underline{\hspace{2cm}}$	$0.25 \times 448 = \underline{\hspace{2cm}}$
$125 \times 544 = \underline{\hspace{2cm}}$	$0.125 \times 5.44 = \underline{\hspace{2cm}}$

6.6 Here we are doing the division of two counting numbers and write them in the form of decimal numbers.

E.g.: Divide 27 by 2



i.e.  $27 \div 2 = 13.5$

E.g.(2) Divide 35 by 4

i.e.  $35 \div 4 = 8.75$

From it can you say how the multiplication is done ?

Now do the problems given below:

(1)  $9 \div 2$ , (2)  $16 \div 5$ , (3)  $31 \div 4$ , (4)  $257 \div 11$ , (5)  $220 \div 8$

6.7 Here we are doing the division of one decimal number by another decimal number.

E.g.(1) Divide 0.4 by 0.2

$$0.4 \div 0.2 = 4 \div 2 = 2$$

E.g.(2) Divide 0.15 by 0.3

$$0.15 \div 0.3 = 15 \div 30 = 0.5$$

Can you write how to divide a decimal number by another decimal number ?

Now fill up the following table.

$8 \div 2 = 4$	$0.8 \div 0.2 = 4$
$16 \div 4 = \underline{\hspace{2cm}}$	$1.6 \div 4 = \underline{\hspace{2cm}}$
$750 \div 25 = \underline{\hspace{2cm}}$	$7.50 \div 0.25 = \underline{\hspace{2cm}}$
$625 \div 25 = \underline{\hspace{2cm}}$	$6.25 \div 2.5 = \underline{\hspace{2cm}}$
$5375 \div 43 = \underline{\hspace{2cm}}$	$53.75 \div 4.3 = \underline{\hspace{2cm}}$

6.8 Here we are changing fractions into decimals.

E.g.(1) Suppose we want to write  $1/16$  as a decimal what should we do ? Divide 1 by 16.

$$\therefore 1/16 = 0.0625$$

E.g.(2) Find the decimal form of  $11/5 = 2.2$

Find the decimal forms of

(1)  $22/7$     (2)  $38/5$     (3)  $415/23$     (4)  $1403/6$

6.9 Find the decimal form of  $1/3$ .

$$1/3 = 0.333 \dots$$

i.e. the digits in the decimal will keep on repeating.

Now find the decimal form of

(1)  $1/6$ , (2)  $1/9$ , (3)  $1/11$ , etc.

What did you find out from it.

Here the digits are repeat without end. This type of decimals have a name. Recurring decimals. So these are all recurring decimals.

Now write the following fractions as decimals. Which are the recurring decimals ?

(1)  $3/10$     (2)  $4/9$     (3)  $5/12$

(4)  $7/20$     (5)  $8/9$     (6)  $4/15$

# CHAPTER VII

## PERCENTAGE

### Concepts

1. Meaning of percentage
2. Comparing the given fractions by using percentage
3. Representing the expenditure in percentage
4. Solving of verbal problems

### Previous knowledge

You know about fractions.

### Introduction

You celebrate birth days at home. Once a boy brought a "Wonder Cake" for his birthday celebration. Five friends were invited to the festival. The cake had to be divided equally among these people. How many pieces will have to be made ? How much each one get ? The cake has to be divided into 5 equal pieces, if you want to divide amongst five people. If you want to give it to 10 people then 10 equal pieces you have to make.

Each one in the first case gets  $\frac{1}{5}$  of the cake.

Each one in the second case gets  $\frac{1}{10}$  of the cake.

The five pieces which you are having will have to be divided again equally to distribute among 10 people.

$$\text{Here } \frac{1}{5} = \frac{2}{10}$$

$$\text{Similarly } \frac{4}{10} = \frac{8}{20}$$

Cost of a pen is Rs. 20. Find out the cost of 100 pens.

Cost of 100 coconuts is Rs. 400. Find the value of each coconut.

### Example 1

Here is an example. Let us solve it. Leela got 48 marks out of 50 in Mathematics, 20 out of 25 in English and 75 out of 100 in Malayalam. For which subject she got the highest marks ?

To get the correct picture of the marks obtained in each subject by Leela, we must have a common standard, i.e. a common denominator.

We must find out the score of each subject say for 100.

$$\text{Marks in Mathematics} = \frac{48}{50} = \frac{96}{100}$$

$$\text{Marks in English} = \frac{20}{25} = \frac{80}{100}$$

$$\text{Marks in Malayalam} = \frac{75}{100}$$

By comparing the above results we can say that Leela got the highest marks in Mathematics.

Here the value of a fraction with a denominator of 100 is called as the percentage.

$$\text{For example } \frac{96}{100} = 96 \text{ percentage}$$

$$\frac{80}{100} = 80 \text{ percentage}$$

$$\frac{75}{100} = 75 \text{ percentage}$$

The percentage is denoted by the symbol %.

### Example

$$\frac{30}{100} = 30\%$$

$$\frac{19}{100} = 19\%$$

$$\frac{10}{100} = 10\%$$

$$\frac{100}{100} = \text{cent per cent}$$

### Example 2

Compare the fractions and find out which is bigger.

$$\frac{14}{25}, \frac{29}{50} \text{ . Converting the fraction into fraction having the}$$

denominator as 100.

You can say that  $\frac{29}{50} > \frac{14}{25}$

### Example 3

$$\frac{9}{25}, \frac{4}{10}$$

Here  $\frac{9}{25} = \frac{36}{100}$ ,  $\frac{4}{10} = \frac{40}{100}$

$$\therefore \frac{4}{10} > \frac{9}{25}$$

### Exercise

Convert the following fraction so that the denominator became 100.

$$\frac{14}{25}, \frac{7}{20}, \frac{1}{5}$$

### Example 4

A farmer sold his coconuts as shown in the table below. Find out the value of 100 coconuts each time. In which month he got more profit? In which month he got less profit ?

Name of the month	Number of coconuts sold	Cost in Rs.	
January	1500	4500	$\frac{4500}{1500} = 3$ $100 \times 3 = 300$
March	2000	8000	$\frac{8000}{2000} = 4$ $100 \times 4 = 400$
May	1000	3000	$\frac{3000}{1000} = 3$ $100 \times 3 = 300$

July	2000	10000	$\begin{array}{r} 10000 \\ \text{-----} \\ 2000 \end{array} = 5$	$100 \times 5 = 500$
September	2500	10000	$\begin{array}{r} 10000 \\ \text{-----} \\ 2500 \end{array} = 4$	$100 \times 4 = 400$
November	800	3200	$\begin{array}{r} 3200 \\ \text{-----} \\ 800 \end{array} = 4$	$100 \times 4 = 400$

Find out the cost of a coconut each time.

Calculate the cost he got for 100 coconuts each time and compare the results.

In January and May he get less and in July he got more profit.

**Exercise**

- Raja and Rani are friends. They saved money for three years, as they were getting birthday gifts from their relatives. Raja saved Rs. 2000 and Rani Rs. 900. Each one of them spent Rs. 600 for their excursion.

  - Find out the percentage of their expense.
  - Who had saved more and
  - Who had spent more money
- Find the value of 25% of 800, 50% of 8000 and 100% of 8000.

**Learning Activity**

- You visit 4 to 5 houses in your street. Note down the number of males and females in each house. Find out the percentage of males in these houses.

	1	2	3	4
Total number	12	10	20	16
Number of males	3	5	9	4
% of males	$\frac{3}{12} \times 100$ 25%	$\frac{5}{10} \times 100$ 50%	$\frac{9}{20} \times 100$ 45%	$\frac{4}{16} \times 100$ 25%

In the second house there are more males. Similarly, you find out the percentage of females in each home.

2. Prepare some fraction cards. Find out the biggest fraction, smallest fraction and equivalent fraction.

### Exercise

1. In a cashew factory there are 400 labourers working in the shelling section. 60 of them are men. What is the percentage of men working in the factory. Compare the percentage of men and women working in the factory.

$$\% \text{ of men} = \frac{60}{400} \times 100 = 15\%$$

$$\% \text{ of women} = \frac{340}{400} \times 100 = 85\%$$

The percentage of women is more than that of men.

2. The number of students in each class and the number of students passed is given below. Find out the percentage of passes in each class. Compare the percentage of the passes. Which class got less result ?



Standards	V	VI	VII	VIII	IX	X
Number of students	300	300	240	500	425	250
Number of students passed	270	240	200	400	410	225
% of passes	$\frac{270}{300} \times 100$ 90%	$\frac{240}{300} \times 100$ 80%	$\frac{200}{240} \times 100$ 83%	$\frac{400}{500} \times 100$ 80%	$\frac{410}{425} \times 100$	$\frac{225}{250} \times 100$

3. Convert the following fraction into percentage.

$$\frac{7}{10}, \frac{4}{5}, \frac{5}{20}$$

$$\frac{7}{10} = \frac{70}{100} = 70\%$$

$$\text{Similarly } \frac{4}{5} =$$

4. The monthly income and expense of a family (budget) is given below. Find out the percentage of each item with reference to the total income.

Total income is Rs. 7500

Food - Rs. 3000 - 40%  $\frac{3000}{7500} \times 100$

Education - Rs. 675

Dress - Rs. 600

Rent - Rs. 1000

Savings - remaining amount

5. Find out 5% of 40, 45% of 240 and 35% of 360

$$\frac{5}{100} \times 40 = 2$$

$$\frac{45}{100} \times 240 =$$

$$\frac{35}{100} \times 360 =$$

6. 100% of 75 = 75

100% of 92 = ?

# CHAPTER VIII

## VOLUME

### Concepts

1. Volume of a rectangular block
2. Volume of a cube
3. Inner volume or capacity (litre)

### Previous Knowledge

The learner knows about rectangle and to calculate the area of a rectangle.

### Introduction

You have seen many objects around you. They have different shapes, sizes and dimensions, such as cubical, rectangular, triangular, circular, etc. Name such objects. Colour the rectangular faces of such objects. Make a list of objects like, ball, match box, powder tin, bricks, etc.

### Activity

Take some match boxes, make two different rectangular blocks. Find out which block is bigger and which is smaller. Count the number of boxes used in each block. You can easily say which block is bigger and which is smaller, depending upon the number of boxes used. Count the number of edges of each box. Measure the length, breadth and the height of each box.

Now try to find out the space occupied by each box. The length of each box is 3 cm, breadth 2 cm and height is 1 cm.

The space occupied by one box is  $3 \times 2 \times 1 = 6$  cubic cms. The space occupied is called as volume. We can find out the volume of any rectangular block or objects, if we know its length, breadth and height. The volume of the rectangular block prepared earlier can also be calculated by knowing the length, breadth and height.

### **Unit Cube**

Take a dice (snake and ladder game). Measure its length, breadth and height. It is 1 cm each,

$$\begin{aligned}\text{The volume of a dice} &= l \times b \times h \\ &= 1 \times 1 \times 1 \\ &= 1 \text{ cubic centimetre}\end{aligned}$$

A rectangular block which has its length, breadth and height as 1 cm, is called a unit cube. Any object having its length, breadth and height equal, is called a cube.

The volume of any object is represented in cubic measure. If  $l$ ,  $b$  and  $h$  are in metres, then  $V = lbh$  cubic metres.

### **Activity**

1. Measure the length, breadth and height of your mathematics box and find out its volume.
2. Measure the inner length, breadth and height of a rectangular shelf and find out its volume.

3. Measure the l, b and h of a rectangular box and find out its volume.
4. Measure the length, breadth and height of a rectangular rice box in your house and find out its volume.
5. Measure the l, b, h of a rectangular pillar in your school, find out its volume.
6. You have seen small rectangular tanks in your house or in your neighbouring houses. Measure the inner length, breadth and height of each of them. Find their inner volume. Find out the outer volume of each of them.

### Exercises

1. Find out the volume of a rectangular block whose length is 4 cms, breadth 4 cms and height 1 cm.

$$V = lbh = 4 \times 4 \times 1 = 16 \text{ cubic cms}$$

2.  $V = 104 \text{ cu cms}$ ,  $b = 4 \text{ cms}$ ,  $h = 2 \text{ cms}$ . Find l.

$$lbh = V$$

$$4 \times 2 \times l = 104$$

$$l = 104/8 = 13 \text{ cms}$$

3.  $V = 384 \text{ cu cms}$ ,  $l = 8 \text{ cms}$ ,  $b = 3 \text{ cms}$ ,  $h = ?$

$$lbh = V$$

$$8 \times 3 \times h = 384$$

$$h = \frac{384}{8 \times 3} = 16 \text{ cms}$$

4. Raju's sister gave him milk in a rectangular vessel. He wanted to know how much milk is present in the vessel. He measured its length, breadth and height as 12 cms, 8 cms and 7 cms. Find out its volume.

$$\begin{aligned}\text{The vessel contains (volume)} &= lbh \\ &= 12 \times 8 \times 7 \\ &= 4020 \text{ cubic cms}\end{aligned}$$

5. The inner length, breadth and height of a rectangular box are 12 cms, 8 cms and 9 cms. Find its inner volume or capacity.

$$\begin{aligned}\text{The capacity of the box (volume)} &= lbh \\ &= 12 \times 8 \times 9 \\ &= 864 \text{ cu cms}\end{aligned}$$

6. The inner side of a cubical vessel is 10 cms. Find its volume.

$$\begin{aligned}\text{The capacity (volume) of the vessel} &= lbh \\ &= 10 \times 10 \times 10 \\ &= 1000 \text{ cu cms}\end{aligned}$$

Here 1000 cc is called as 1 litre.

7. A rectangular water tank has a length 25 cms, breadth 16 cms. It contains 4800 cc of water. What is the height of the water level present in it ?

$$\text{Height of the water level} = \frac{4800}{25 \times 16} = 12 \text{ cms}$$

8. The volume of a rectangular block is 9072 cc,  $l=27$  cms,  $b=21$  cms. Find its height.

$$V = lbh, \quad lbh = V$$

$$h = \frac{V}{lb} = \frac{9072}{27 \times 21} = 28 \text{ cms}$$

9. Find out  $l$ ,  $V = 7920$  cc,  $b = 18$  cms,  $h = 22$  cms

10. Find out  $h$ ,  $V = 8572$  cc,  $l = 28$  cms,  $b = 6$  cms

**Note:** The inner volume is calculated to know the capacity of a container such as a vessel, water tank, etc. Secondly, the outer volume is calculated to find out the space occupied by the objects.

# CHAPTER IX

## SOME GEOMETRICAL CONSTRUCTION

### Concepts

1. Mid point of a straight line, bisector of a line segment.
2. Perpendicular bisector of a straight line.
3. Drawing a perpendicular at a point on a straight line, using compass.
4. Drawing a perpendicular from a point outside the straight line, using a compass.

### Previous Knowledge

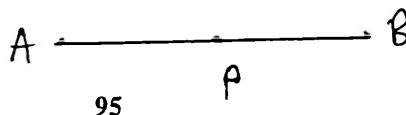
You know that a point is a dot with no dimensions. If two points are joined straight, then it becomes a straight line. Many lines can be drawn through a point. Line segment is the part of a line. A circle is a closed curved line. The part of a circle is called an arc.

### Introduction

In a playground, you can see several markings, the central line, the boundary line a curved line, etc. In a badminton court you can see straight lines and perpendicular lines.

### Example

AB is a line segment, P is a point on it. Hence  $AP = BP$ . P is the mid point of AB.



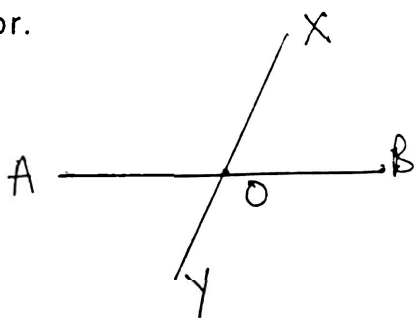


## Activity

You have a ribbon. How do you cut into two equal parts. A bar chocolate has to be cut into 2 equal parts. Find the mid points of the edges of a bench, a table, a desk, veranda and lines on the badminton court.

**A mid point of a line segment is equidistant from the end points of the line segment**

A line passing through the mid point of a line segment is called the bisector.



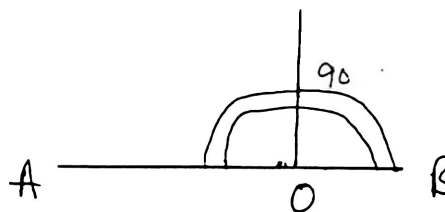
AB is a line segment. O is the mid point. XOY is the bisector of AB.

## Activity

Draw a line segment on the floor. A string or a wire is used to locate the mid point. Any number of strings can be passed through the mid point.

'O' is a point on a line segment AB.

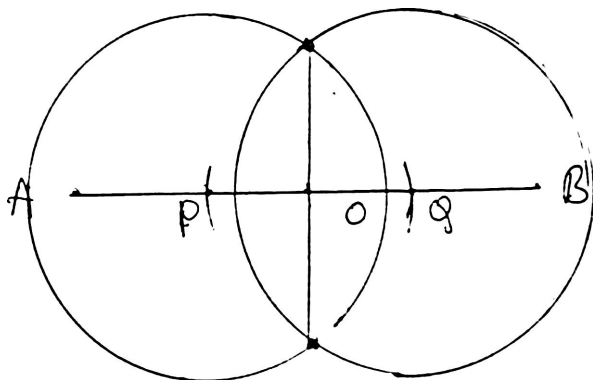
Using a protractor construct an angle of  $90^\circ$  at O.



$$\angle POA = \angle POB = 90^\circ$$

PO is perpendicular to AB at O.

## Drawing a perpendicular bisector of a line segment



Draw a line segment AB. Mark its mid point 'O'. With 'O' as centre mark two points P and Q at equal distance from O. With P and Q as centres, with a convenient radius draw two circles to intersect at M and N (the same radius has to be used). Join MN. MN passes through O. Now MN is the perpendicular bisector of AB, passing through the mid point O.

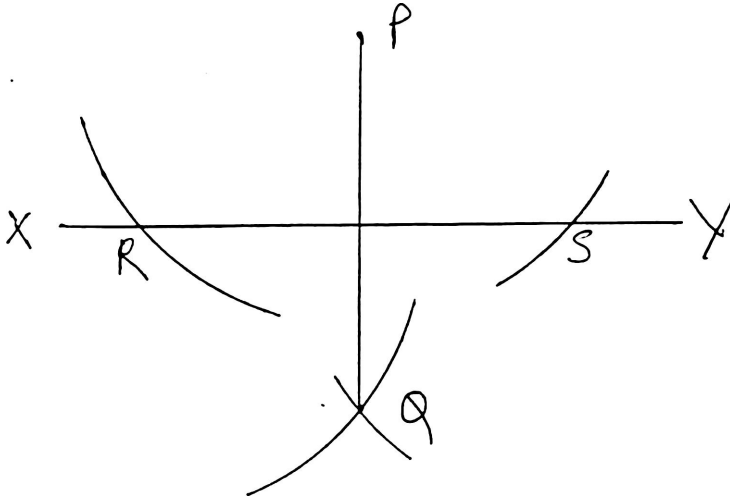
$$\text{Now } \angle AOM = \angle BOM = 90^\circ$$

### Activity

1. Using strings and nails, the mid point of a line segment can be located and the perpendicular bisectors can be drawn on the ground.
2. Draw a triangle. Draw the perpendicular bisector of its sides.
3. Draw a square. Draw the perpendicular bisectors of its sides.

## Drawing a perpendicular to a line segment from a point outside it

XY is a line segment. P is a point not on it. You have to draw a perpendicular from P to XY.



With P as centre draw an arc to cut XY at R and S (with a convenient radius). Again, with R and S as centres, having the same radius draw two arcs to cut at Q. Join PQ. PQ passes through O a point on XY. PO is perpendicular to XY at O.  $\angle POX = \angle POY = 90^\circ$

You find out the nearest distance between you and a wall in your house. You have to know the perpendicular distance.

### Exercises

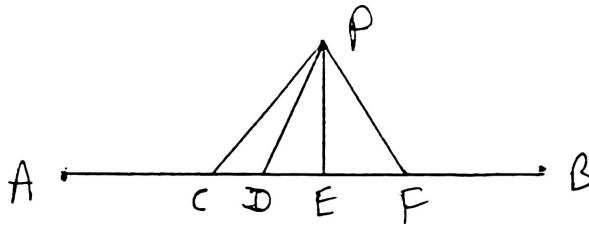
1. Draw the line segments and locate their mid points.

AB = 8 cm, PQ = 7.5 cm, LM = 10.2 cm, RS = 9.6 cm

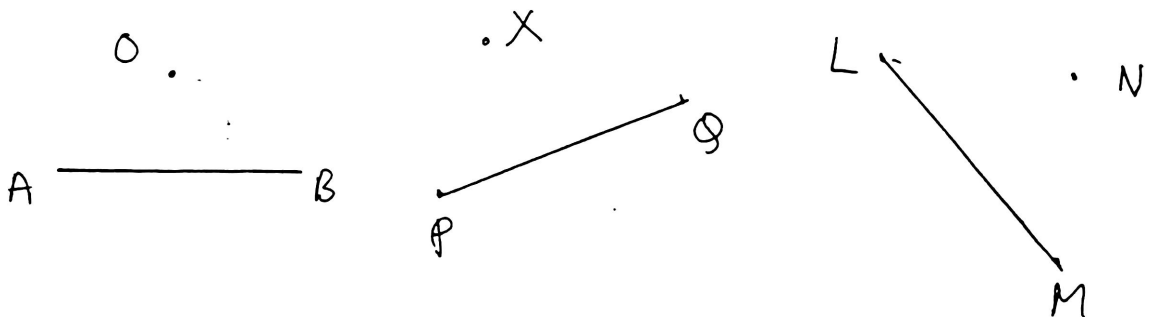
2. Draw the following line segments. Draw the perpendicular bisectors in each case.

$PQ = 7 \text{ cm}$ ,  $AB = 6 \text{ cm}$ ,  $RS = 9.5 \text{ cm}$ ,  $XY = 10.2 \text{ cm}$

3. Measure each line segment in the diagram. Which is the shortest one ?



4. Draw perpendiculars to each line segments from the points located outside them.



# CHAPTER X

## INTEREST

### Concepts

Meaning of interest, deposits, loans, principal, calculation of interest, rate of interest, period, derivation of the formula for calculating interest. The amount of interest either increases or decreases depending upon the principal or the period.

### Previous Knowledge

You have studied about fractions and percentage. You also know how to convert a fraction into percentage. You may be aware of such practices as borrowing money, depositing money and lending money.

### Introduction

We need money every day for all transactions. We want money to satisfy our needs. If we are short of money, we borrow money from banks or money lenders. We have to pay excess money when we return it. If we have excess money, we deposit the same in a bank or in certain schemes. Here we get more money in addition to the deposited amount after a duration of time such as 6 months, a year, three years or 5 years.

**Example 1:** In the table below, the amount borrowed and the excess money paid is shown.

Name	Sita	Balu	Prema	Suresh
Amount borrowed	5000	7000	8500	4500
Amount repaid	5500	8000	10000	4800
Excess amount paid	500	1000	15000	300

In the above table, the excess amount paid is called the interest.

### Activity

You visit a post office and ask about the different types of saving schemes such as Savings Bank Account, RD account, Indira Vikas Patra, National Savings Certificates, etc. (i) You hire a cycle and pay money for using it for an hour or two. (ii) We have to pay excess money as you know, if we borrow money.

**Example 2:** Observe the table

Period	6 months	1 year	2 years	3 years
Interest paid	Rs. 10	Rs. 20	Rs. 40	Rs. 60

**Example 3:** Ravi borrowed Rs. 5000 from a bank. The bank charges 18% interest. How much interest he has to pay after three years.

$$\text{Interest is } 18\% = \frac{18}{100}$$

$$\text{Interest for 1 year on the amount of Rs. 5000} = 5000 \times \frac{18}{100}$$

$$\text{Interest for 3 years on the amount of Rs. 5000} = 5000 \times \frac{18}{100} \times 3$$

$$= \text{Rs. 2700}$$

#### Example 4: Comparing of interests

Bank	A	B	C	D	E
Rate of interest	10%	9%	8%	11%	13%
Interest on Rs. 1000 for 1 year (Rs.)	100	90	80	110	130

As the rate of interest increases, there is an increase in the amount of interest.

**Example 5:** If the period changes then also the interest changes eventhough the rate of interest is the same.

Principal	Rs. 6000	Rs. 6000	Rs. 6000	Rs. 6000
Rate of interest	11%	11%	11%	11%
Period	1 year	2 years	3 years	6 months
Interest in Rs.	660	1320	1980	330

You may visit a bank and find out the facilities available regarding the savings, deposit schemes, loans and rates of interest given, etc.

Derivation of the formula =  $I = PRN$

Vinod borrowed Rs.10000 from a bank 2 years ago. The bank charges an interest of 16% per annum. How much he has to pay to the bank to settle his account ?

Principal = Rs. 10000

Rate of interest =  $16\% = \frac{16}{100}$

Duration of time = 2 years

Interest =  $10000 \times \frac{16}{100} \times 2$   
= 3200

[ $\therefore$  Interest (I) =  $P \times R \times N$ ; where; P = Principal; R = Rate; N = Period]

Amount Vinod has to pay now = 10,000 + 3,200

= Rs. 13,200

### Activity

Each indicating the principal, rate of interest and years may be prepared as shown below.

Rs. 100	Rs. 300	Rs. 500	Rs. 800	Rs. 1000
3%	4%	8%	13%	
1	2	3		

Different combinations are made and interest may be computed.



## Exercises

1. From the table given below, calculate the interest in each case.

Principal	Rs. 2500	Rs. 3000	Rs. 6500	Rs. 8000	Rs. 10000
Period	1 year	2 years	3 years	4 years	6 months
Rate in interest	9%	8%	13%	15%	18%
Amount of interest					

2. Choose an amount from the first row, a period from the second row and a rate from the third row and calculate the interest. (use the above table)
3. Joseph deposited Rs. 20,000 in a bank, where the rate of interest on deposits is 13%. He withdraws his deposit after four years. How much money will he get altogether ?

# CHAPTER XI

## PROFIT AND LOSS

### Concepts

1. Investment
2. Meaning of profit and loss
3. Comparing cost price and selling price
4. Percentage of profit and loss

### Previous Knowledge

You are familiar with some knowledge regarding buying and selling in your locality. Some people purchase objects and sell them to get more money. Some time they may get less money.

### Introduction

You need many things such as food, clothes, books, bags, umbrellas, etc. Money is essential to purchase these things. People earn money by working in some profession. What is the occupation of your father ? Is your mother employed ? Some people earn money by doing business. What are the types of business you have seen ? Enlist them.

1. One should invest some money to start a business. This amount is called initial investment.

**Example 1:** Raju's father is a fruit merchant. He buys fruits from Tamil Nadu. He spends Rs. 2000 to buy fruits. He also spends Rs. 300/- for transportation.

Then his total investment is Rs. 2000 + Rs. 300

$$= \text{Rs. } 2,300$$

Suppose he sells it for Rs. 2800. He gets more money than his investment. The additional money, i.e. Rs. 500 is called profit.

Profit means the extra money that one gets over his total cost of investment in a business.

**Example 2:** Susan's father is a seller of Agarbathis. Last week he bought agarbathis for Rs. 1000 and sold it for Rs. 1500.

Here he invested Rs. 1000 and earned Rs. 500 as profit. That means he earned a profit of 50%.

$$\text{Profit percentage} = \frac{500}{1000} \times 100 = 50\%$$

**Example 3:** Ramal bought 25 hens from the market for Rs. 2000. On the way five of them died. He sold the remaining hens to a hotel for Rs. 1,900. Here he had to loose money. His selling price was less than the cost price. Here the loss is Rs. 100.

Loss means, the amount lost in a business. Loss will be there if the selling price is less than the cost price.

$$\text{In the above example loss percentage is } \frac{100}{2500} \times 100 = 4\%$$

**Example 3:** Vinod had spent Rs. 1500 on his goat. He wanted money urgently. He had to sell it for Rs. 1250. In this sale he got less money than the investment. He lost Rs. 250. The amount lost is Rs. 250.

$$\text{Percentage of loss is } \frac{250}{1500} \times 100 = 16 \frac{2}{3} \%$$

**Example 4:** In the following table, cost price and selling price of some articles are given. Compare and understand whether there is profit or loss.

Article	Cost price Rs.	Selling price Rs.	Profit/Loss	%
Umbrella	90	120	Profit	$\frac{30}{90} \times 100\%$
Shoes	250	300	Profit	$\frac{50}{250} \times 100\%$
Rice	1100	1050	Loss	$\frac{50}{1100} \times 100\%$
Fish	750	725	Loss	$\frac{25}{750} \times 100\%$

Profit and Loss are calculated in percentage.

**Example 5:** Geetha and Meera are friends. Geetha spent Rs. 4000 to set up a toy shop and Meera spent Rs. 7000 to start a bakery. After a month, they compared their earnings. Geetha had made a profit of Rs. 1000, and Meera had made a profit of Rs. 2100. Whose business is better ?

You cannot compare and say, whose business is better by merely comparing their profits, as they have spent different amounts for their business.

It is necessary to find out the percentage of profit in each case.

$$\text{Geetha's profit percentage} = \frac{1000}{4000} \times 100 = 25\%$$

$$\text{Meera's profit percentage} = \frac{2100}{7000} \times 100 = 30\%$$

Now you can very easily say that Meera's business is better as the profit percentage is more.

**Example 6:** In a sale the cost price of a table is Rs. 3000.

It is sold for Rs. 3000 itself. Is there any profit or loss ?

Here, both the cost price and the selling price are the same. There is no profit and no loss in this case.

**Example 7:** The table below gives the amount spent by some fruit sellers. Find their profit or loss. Understand the percentage of profit or loss.

Name of the fruit seller	Total cost Rs.	Selling price Rs.	Profit/Loss Rs.	Percentage of profit/loss %
Bhasi	7500	9000	Profit 1500	Profit 20%
Madan	4250	3910	Loss 3400	Loss 8%
John	9000	9000	-	-

### Activity

Suppose your parent wants to start a business - a toy shop, a bakery or a ready made cloth store. Can you help him in any way for running the business ?

### Exercises

1. The cost price of a wrist watch is Rs. 480. It is sold for Rs. 500.

What is the percentage of profit ?

2. Ahmed is a fish trader. He bought a basket of fish for Rs. 900. He sold it for Rs. 850. What is the percentage of loss here ?

3. Kamala is a cloth merchant. She bought some clothes for Rs. 7000 and sold it for Rs. 7600. How much she gained in this business ? What is the percentage of profit ?

4. Complete the table below.

Total cost Rs.	Selling price Rs.	Profit/Loss Rs.	% of profit/loss
8400	9660	1260	$\frac{1260}{8400} \times 100$
9660	9120		
4850	4850		

## CHAPTER XII

### DISCOUNT

#### Concepts

Meaning of discount. Usefulness of discount. Marked price and selling price. Calculation of discount, marked price, selling price. Percentage of discount.

#### Previous Knowledge

You are familiar with ideas of profit, loss and percentages.

#### Motivation

During festivals like Onam, Bakrid, Ramzan, Christmas, Deepavali, etc., we are purchasing many goods from different shops. Name some commodities you have purchased during such festivals, such as cosmetics, clothes, food items, TV, radio, cooker, fridge, washing machine, etc.

Have you seen some special festival offer on the TV or in the newspaper during festival seasons ?

Sometimes we can see a large board in front of certain shops, advertising various types of offers.

Can you enlist some such special festival offers ?

**Example:** "Buy a saree and get a blouse piece free"

"Buy a mattress and a pillow is free"

"Buy two soaps and get one soap free"

Sometimes, certain commodities are sold for a reduced price than the marked price.

**Example:** The marked price of a bed sheet is Rs. 150.

It is sold for a reduced price of Rs. 125.

The books are sold at a reduced price during the book exhibition.

What is the name given to such types of offerings in business ?

Why such offerings are made ?

### **Meaning of Discount**

Sometimes, when we purchase some objects, we get some benefits either in the reduction of prices or some gifts. Such an offer involves 'discount'.

**Example:** Raju got some money from his uncle. He went with his elder sister to the market to purchase a pair of shoes. They saw a notice board in front of a shop offering 10% discount for footwears. They went inside the shop and purchased a pair of shoes. The price on the sticker was Rs. 300. The shop keeper received Rs. 270 only. In this sale Raju got Rs. 30 as a reduction. In this bargain Rs. 30 is the discount.

### **Usefulness of Discount**

1. On certain occasions, some companies offer a discount to push their commodities to the market and clear their stocks.
2. Some shopkeepers do it to increase their sales.



**Example 3:** A soap manufacturing company, produced a large quantity of toilet soaps. The company has to push its goods into the market. In such a situation the company offers a discount on its commodities.

Secondly, the offering of discount will attract more customers. Sales will increase and profit will also be there. The company will prosper.

### **Marked Price and Selling Price**

The company fixes the price on its goods and puts stickers on it. This is called on the marked price. For example, chappals and shoes are exhibited with a marked price on them.

Selling price is the actual price, the customer pays when he purchases the commodity.

**Example:** The price on the sticker of a book is Rs. 75.

The book seller sold it for Rs. 70.

Here the marked price is Rs. 75 and the selling price is Rs. 70.

Discount is Rs. 5.

### **Calculation of discount, marked price, selling price**

In a business transaction, a discount is allowed. By subtracting the selling price from the marked price. We get the discount.

Marked Price - Selling Price = Discount

Marked Price - Discount = Selling Price

Selling Price + Discount = Marked Price

**Example 1:** Radha bought a saree for Onam. The price stamped on it was Rs. 325. The shop keeper sold it for Rs. 300. What is the discount ?

$$\begin{aligned}\text{Discount} &= \text{Marked Price} - \text{Selling Price} \\ &= 325 - 300 \\ &= \text{Rs. } 25\end{aligned}$$

**Example 2:** Vinod bought a book whose cost was Rs. 160. The book seller gave him a discount of Rs. 15. How much money Vinod had to pay for the book ?

$$\begin{aligned}\text{Selling Price} &= \text{Marked Price} - \text{Discount} \\ &= 160 - 15 \\ &= \text{Rs. } 145\end{aligned}$$

**Example 3:** A cloth merchant gives a discount of Rs. 20 on all varieties of Maxies. Lakshmi bought a maxie from that shop by paying Rs. 90. What was the marked price of the maxie ?

$$\begin{aligned}\text{Marked Price} &= \text{Selling Price} + \text{Discount} \\ &= 90 + 20 \\ &= \text{Rs. } 110\end{aligned}$$

### **Percentage of Discount**

We know that discount is given on the marked price. Percentage of discount means the amount of reduction out of 100 as the marked price.

**Example 1:** The marked price of a shirt is Rs. 100 and it is sold for Rs. 90. What is the percentage of discount ?

Discount = Marked Price - Selling Price

$$= 100 - 90$$

$$= \text{Rs. } 10$$

$$\text{Percentage of discount} = \frac{10}{100} \times 100 = 10\%$$

**Example 2:** The price of a pressure cooker is Rs.1000. Till March 31 a discount of Rs. 150 is given. What is the percentage of discount allowed?

Marked Price = Rs. 1000

Discount = Rs. 150

$$\text{Percentage of discount} = \frac{150}{1000} \times 100 = 15\%$$

**Example 3:** Gomathi went to a book shop. There a 20% discount is allowed for all books. She purchased a book worth Rs. 240. How much money should she pay for the book ?

Marked price of the book = Rs. 240

Percentage of discount = 20%

If the marked price is Rs. 100, discount is Rs. 20.

Then the selling price is Rs. 80.

If the marked price is Rs. 100, selling price is Rs. 80

$$\begin{aligned} \text{If the marked price is Rs. 240, selling price is } & \frac{80}{100} \times 240 \\ & = \text{Rs. 192} \end{aligned}$$

### Activity

You accompany your elder brother to nearby shops and see what types of discount offerings are given for the commodities.

### Precaution

Some companies and shop keepers offer very attractive discount on certain commodities. Sometimes these goods may not be of good standard and quality. In some cases they are of old stock. You should be careful while purchasing things for which more discount is allowed.

### Exercises

1. An almirah costs Rs. 4,500. As an introductory offer, 12% discount is allowed. What is its selling price ?
2. A cycle costs Rs. 1,750 and a 10% discount is given. How much one should pay to buy it ?

## LIST OF PARTICIPANTS

1. K.P. Narayanan  
Assistant Teacher  
A.U.P. School, Malappuram
2. K. Premraj  
Assistant Teacher  
Girls High School  
Velanchery
3. Krishnan Namboodiri, V.E.  
Assistant Teacher  
A.U.P. School, Choolur, Calicut
4. Denni Morais, D.  
U.P.S.A.  
St. Thomas H.S.S., Poonthure  
Thiruvananthapuram
5. Ramakrishnan, K.P.  
Assistant Teacher  
Poilkav U.P. School, PO Edakkulam  
Quailandy-673 306
6. Vinodan, P.  
P.D. Teacher  
DIET Lab School  
Palayad PO, Thalassery  
Kannur District
7. V. Somarajan  
P.D. Teacher  
Government HSS  
Kilimannoor, Trivandrum
8. M.K. Mehaboob  
UPS Assistant  
Govt. Higher Secondary School  
Venjaramoode, Trivandrum
9. C. Kamalasana Kurup  
UPS Assistant, Govt. HSS  
Bharathannoor, Bharathannoor PO  
Triandrum District

10. A. Lazar  
U.P.S. Assistant  
Govt. Model BHSS  
Thycand, Thiruvananthapuram
11. Sivathanu Pillai, C.  
U.P.S. Assistant  
Govt. Model Boy's Higher Secondary School  
Thycand PO  
Thiruvananthapuram
12. R. Anandakrishnan Chettiar  
P.D. Teacher  
Govt. H.S., Azhoor  
Azhoor PO  
Thiruvananthapuram District
13. Mary Celine  
U.P.S. Assistant  
Govt. Girls Higher Secondary School  
Cotton Hill  
Thiruvananthapuram
14. Saramma P. Daniel  
P.D. Teacher  
Govt. Girls' Higher Secondary School  
Cotton Hill  
Trivandrum  
  
Susan Mathew  
P.D. Teacher  
Govt. V.H.S.S.  
Vathiyookavu  
Thiruvananthapuram
16. C. Geetha  
P.D. Teacher  
G.V.H.S.S., Vathiyookavu  
Vathiyookavu PO  
Thiruvananthapuram
17. Suseelakumari, B.  
P.D. Teacher  
J.M.H.S., Sasthamcutta  
Kollam District