Government of Karnataka

MATHEMATICS

Standard

5

Part I

Karnataka Text Book Society (R.)
100 Feet Ring Road,
Banashankari 3rd Stage, Bengaluru-85

PREFACE

The Textbook Society, Karnataka has been engaged in producing new textbooks according to the new syllabi prepared which in turn are designed based on NCF – 2005 since June 2010. Textbooks are prepared in 11 languages; seven of them serve as the media of instruction. From standard 1 to 4 there is the EVS and 5th to 10th there are three core subjects, namely, mathematics, science and social science.

NCF – 2005 has a number of special features and they are:

- Connecting knowledge to life activities.
- Learning to shift from rote methods.
- Enriching the curriculum beyond textbooks.
- Learning experiences for the construction of knowledge.
- Making examinations flexible and integrating them with classroom experiences.
- Caring concerns within the democratic policy of the country.
- Make education relevant to the present and future needs.
- Softening the subject boundaries integrated knowledge and the joy of learning.
- The child is the constructor of knowledge.

The new books are produced based on three fundamental approaches, namely :

Constructive Approach, Spiral Approach and Integrated Approach

The learner is encouraged to think, engage in activities, master skills and competencies. The materials presented in these books are integrated with values. The new books are not examination-oriented in their nature. On the other hand they help the learner in the total development of his/her personality, thus help him/her become a healthy member of a healthy society and a productive citizen of this great country, India.

In Social Science especially in Standard 5, the first chapter deals with the historical, geographical, cultural and local study of the division in which learners live. A lot of additional information

is given through box items. Learners are encouraged to work towards construction of knowledge through assignments and projects. Learning load of memorizing dates has been reduced to the minimum. Life values have been integrated with content of each chapter.

We live in an age of science and technology. During the past five decades man has achieved great things and realized his dreams and reached pinnacle of glory. He has produced everything to make life comfortable. In the same way he has given himself to pleasures and reached the stage in which he seems to have forgotten basic sciences. We hope that at least a good number of young learners take to science in higher studies and become leading scientists and contribute their share to the existing stock of knowledge in order to make life prosperous. Ample opportunity has been given to learners to think, read, discuss and learn on their own with very little help from teachers. Learning is expected to be activity centered with the learners doing experiments, assignments and projects.

Mathematics is essential in the study of various subjects and in real life. NCF 2005 proposes moving away from complete calculations, construction of a framework of concepts, relate mathematics to real life experiences and cooperative learning. Many students have a maths phobia and in order to help them overcome this phobia, jokes, puzzles, riddles, stories and games have been included in textbooks. Each concept is introduced through an activity or an interesting story at the primary level. The contributions of great Indian mathematicians are mentioned at appropriate places.

The Textbook Society expresses grateful thanks to the chairpersons, writers, scrutinisers, artists, staff of DIETs and CTEs and the members of the Editorial Board and printers in helping the Textbook Society in producing these textbooks.

Prof. G S Mudambadithaya
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Chairperson speak....

This 5th standard Mathematics Text book is prepared according to the revised syllabus based on NCF (2005). The basic feature highlighted in NCF(2005) and seriously adopted in this textbook is that " The child is the constructor of her/his own knowledge". A sincere attempt has been made to follow this principle and make mathematics learning a meaningful and joyful experience for children.

The focus in this text book is on **experiential learning** which is based on both **hands-on** and **minds-on** activities. The emphasis is on,

- engaging students in higher order learning tasks,
- guiding students to explore mathematical facts, concepts, generalisations and procedures,
- providing opportunities to express their newly constructed ideas,
- encouraging students to expand/elaborate the ideas by using or applying them in variety of situations/problems relating to real life situations.

Group activity emphasising co-operative learning is the suggested instructional strategy for transacting all the units in this textbook. Every unit begins with an engaging activity which is concrete in nature. Teachers can follow suggested activities or plan and create similar activities for specific purposes.

Additional enriched information is provided in boxes titled " Do you know?" and thought provoking questions in boxes titled "Think!". It should be noted that these two are not for tests and examinations.

Two new units are included in this text book. The purpose of the unit on "Mental Arithmetic" is to provide good practice for mental calculations and enhance speed of mathematical calculations in children. The unit on "Patterns" includes both number patterns and geometrical patterns. This unit enables children to appreciate the beauty of mathematics through its structures and patterns.

We hope that teachers and parents use this text book to facilitate learning environments for children to construct their own knowledge; and students enjoy working through it.

Constructive suggestions are welcome to improve the quality of this textbook.

We sincerely express our grateful thanks to The Karnataka Textbook Society and all its members who co-operated with us.

Dr. G. Vijayakumari
Chairperson
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About the Revision of Textbooks

Honourable Chief Minister Sri Siddaramaiah who is also the Finance Minister of Karnataka, in his response to the public opinion about the New Textbooks from standard one to ten, announced, in his 2014-15 budget speech of constituting an expert-committee, to look into the matter. He also spoke of the basic expectations there in, which the Textbook experts should follow: " The Textbooks should aim at inculcating social equality, moral values, development of personality, scientific temper, critical acumen, secularism and the sense of national commitment", he said.

Later, for the production of the Textbooks from class one to tenth, the Department of Education constituted twenty seven committees and passed an order on 24-11-2014. The committees so constituted were subject and class-wise and were in accordance with the standards prescribed. Teachers who are experts in matters of subjects and syllabi were in the committees.

There were already many complaints, and analyses about the Textbooks. So, a freehand was given in the order dated 24-11-2014 to the responsible committees to examine and review text and even to prepare new text and review if necessary. Afterwards, a new order was passed on 19-9-2015 which also gives freedom even to re-write the Textbooks if necessary. In the same order, it was said that the completely reviewed Textbooks could be put to force from 2017-18 instead of 2016-17.

Many self inspired individuals and institutions, listing out the wrong information and mistakes there in the text, had sent them to the Education Minister and to the 'Textbook Society'. They were rectified. Before rectification we had exchanged ideas by arranging debates. Discussions had taken place with Primary and Secondary Education 'Teacher Associations'. Questionnaires were administered among teachers to pool up opinions. Separate meetings were held with teachers, subject inspectors and DIET Principals. Analytical opinions had been collected. To the subject experts of science, social science, mathematics and languages, textbooks were sent in advance and later meetings were held for discussions. Women associations and science related organistation were also invited for discussions. Thus, on the basis of all inputs received from various sources, the textbooks have been reviewed where ever necessary.

Another very important thing has to be shared here. We constituted three expert committees. They were constituted to make suggestions after making a critical study of the text of science, mathematics and social science subjects of central schools (N.C.E.R.T), along with state textbooks. Thus, the state text books have been enriched basing on the critical analysis and suggestions made by the experts. The state textbooks have been guarded not to go lower in standards than the textbooks of central school. Besides, these textbooks have been examined along side with the textbooks of Andhra, Kerala, Tamil Nadu and Maharashtra states.

Another clarification has to be given here. Whatever we have done in the committees is only review, it is not the

total production of the textbooks. Therefore, the forms of already prepared textbooks have in no way been affected or distorted. They have only been reviewed in the background of gender equality, regional representation, national integrity, equality and social harmony. While doing so, the curriculum frames of both central and state have not been transgressed. Besides, the aspirations of the constitution are incorporated carefully. Further, the reviews of the committees were once given to higher expert committees for examination and their opinions have been effected into the textbooks.

Finally, we express our grateful thanks to those who strived in all those 27 committees with complete dedication and also to those who served in higher committees. At the same time, we thank all the supervising officers of the

'Text book Society' who sincerely worked hard in forming the committees and managed to see the task reach it's logical completion. We thank all the members of the staff who co-operated in this venture. Our thanks are also due to the subject experts and to the associations who gave valuable suggestions.

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PART I

CONTENTS

Unit - 1

5 - DIGIT NUMBERS

After studying this unit you can,

- read and write 5-digit numbers,

- recognise place value of digits in 5 - digit number,

- expand the 5-digit number according to the place value of digits and write the numbers in the standard form,

- arrange the 5-digit numbers in ascending and descending order,

- write the skip numbers for given 5 digit numbers.

You have learnt about 4-digit numbers in the previous class. You know how to write the numbers in - words, place value chart, standard form, expanded form and vice versa.

Revision Exercise

I. Write the place value chart for the given numbers.

1) 2,684   2)   7,000

3) 9,806   4)   8,649

II. Write the following in words.

1) 1,739   2)   3,007

3) 4,088   4)   11,900

III. Write in figures.

1) Nine thousand three hundred fifteen.

2) Two thousand four hundred.

3) Seven thousand thirty six.

IV. Answer the following.

1) Write the greatest 3-digit number.

2) Write the smallest 3-digit number.

3) Write the greatest 4-digit number.

4) Write the smallest 4-digit number.

V. Compare the numbers and write = , > or < sign in between the numbers.

1) 3,567 ———— 4,567

2) 6,582 ———— 6,385

3) 7,384 ———— 7,384

VI. Write the greatest and the smallest 4-digit numbers using the following digits (without repeating the digits).

1) 1, 2, 3, 4

2) 6, 3, 8, 0

3) 5, 2, 7, 4

VII. Write the following numbers in ascending order.

1) 2,456   2,465   2,565   2,546

2) 5,768   5,678   5,687   5,867

3) 8,901   8,910   8,109   8,190

VIII. Write the following numbers in descending order.

1) 2,947   3,038   2,930   3,830

2) 4,892   4,982   4,082   4,792

3) 5,678   5,778   5,878   5,978

5-digit numbers

Example 1

Sanjeev has collected 9,999 agarbathis and bundled (grouped) them as shown below.

Ten Thousands	Thousands	Hundreds	Tens	Units
Number	9	9	9	9

If his father gave him one more agarbathi, how many agarbathis does Sanjeev have now ?

Ten Thousands	Thousands	Hundreds	Tens	Units
+				
Carry				
Total				
Number 1	0	0	0	0

- In this example, the number of agarbathis obatined is a 5-digit number.

- The obtained 5-digit number 10,000 is read as "TEN THOUSAND"

- The numbers from 10,000 to 99,999 are 5-digit numbers.

- 10,000 is the least 5-digit number.

- 99,999 is the greatest 5-digit number.

Some of the 5-digit numbers are given in words in the table below. Read them.

Number	In words
10,001	Ten thousand one
10,010	Ten thousand ten
11,279	Eleven thousand two hundred seventy nine
20,100	Twenty thousand one hundred
33,333	Thirty three thousand three hundred thirty three
45,698	Forty five thousand six hundred ninety eight
50,000	Fifty thousand
61,030	Sixty one thousand thirty
75,032	Seventy five thousand thirty two
80,574	Eighty thousand five hundred seventy four
99,999	Ninety nine thousand nine hundred ninety nine

Observe the following table.

greatest number having	Add 1	Sum	Conclusion Smallest
Single digit → 9	9 + 1	10	Two digit number
Two digit → 99	99 + 1	100	Three digit number
Three digit → 999	999 + 1	1,000	Four digit number
Four digit →9,999	9,999 + 1	10,000	Five digit number

When one is added to the greatest number of each given number of digits, we get the smallest number of next given number of digits.

Read the given abacus
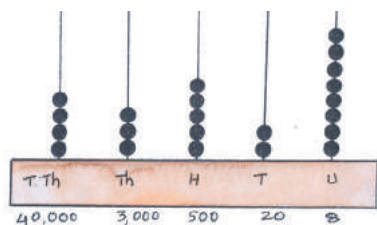
Last string from the units place denotes ten thousands place.

yes, it is 43,528

| T.Th | Th | H | T | U |
| 40,000 | 3,000 | 500 | 20 | 8 |

Ten Thousand = 10 Thousands

Thousand = 10 Hundreds

Hundred = 10 Tens

Ten = 10 Units
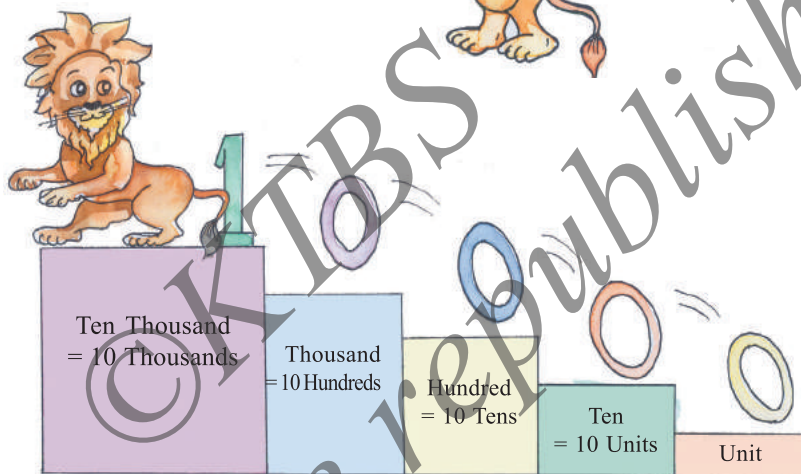
Unit

$$43,528 = 4 \times 10,000 + 3 \times 1,000 + 5 \times 100 + 2 \times 10 + 8 \times 1$$
$$= 40,000 + 3,000 + 500 + 20 + 8$$

Place value chart and expanded form of 5-digit number

Example 1

Write the number fifty three thousand twenty five in place value chart and its expanded form.

Thousands group		Units group		
Ten thousands	Thousands	Hundreds	Tens	Units
10,000	1,000	100	10	1
5	3	0	2	5

53,025 is expanded as

5×ten thousand + 3×thousand + 0×hundred + 2×ten + 5×unit

$= 5 \times 10,000 + 3 \times 1,000 + 0 \times 100 + 2 \times 10 + 5 \times 1$

$= 50,000 + 3,000 + 0 + 20 + 5$

Example 2

Write 98,431 in place value chart and its expanded form.

Ten thousands	Thousands	Hundreds	Tens	Units
10,000	1,000	100	10	1
9	8	4	3	1

98,431 is expanded as

9×ten thousand + 8×thousand + 4×hundred + 3×ten + 1×unit.

$= 9 \times 10,000 + 8 \times 1,000 + 4 \times 100 + 3 \times 10 + 1 \times 1$

$= 90,000 + 8,000 + 400 + 30 + 1$

Writing expanded form of numbers in standard form

Example 1

Write 8×ten thousand + 5×thousand + 2×hundred + 7×ten + 6×unit in standard form.

8×ten thousand + 5×thousand + 2×hundred + 7×ten + 6×unit

$= 8 \times 10,000 + 5 \times 1,000 + 2 \times 100 + 7 \times 10 + 6 \times 1$

$= 80,000 + 5,000 + 200 + 70 + 6$

$= 85,276$

The number 85,276 is represented through abacus as follows.
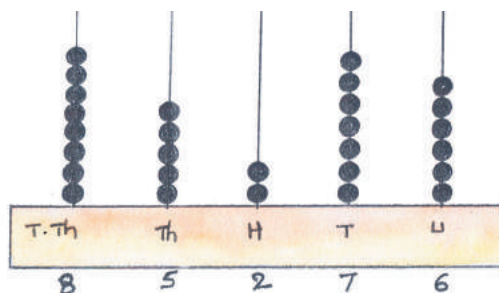
Example 2

Write $3 \times 10,000 + 0 \times 1,000 + 0 \times 100 + 4 \times 10 + 9 \times 1$ in standard form.

$3 \times 10,000 + 0 \times 1,000 + 0 \times 100 + 4 \times 10 + 9 \times 1$

$= 30,000 + 0 + 0 + 40 + 9$

$= 30,049$

Formation of the greatest and the smallest 5-digit number with given digits

Example 1

Form the greatest and the smallest 5-digit numbers using the digits 9, 4, 6, 1, 3 without repeating them.

To form the greatest 5-digit number

- Compare the given digits.
- Write them in descending order   9, 6, 4, 3, 1.
- Get the greatest 5-digit number   96,431.

The greatest 5-digit number using the digits 9, 4, 6, 1, 3 without repeating is 96,431.

To form the smallest 5-digit number.

- Compare the given digits.
- Write the given digits in ascending order   1,3,4,6,9.
- Get the smallest 5-digit number   13,469.

The smallest 5-digit number using the digits 9, 4, 6, 1, 3 without repeating is 13,469.

To form the smallest 5-digit number with one of the digits as zero.

Example 2

Form the smallest 5-digit number using digits 4, 8, 0, 2, 5 without repeating them.

● Compare the digits given.

● Write the given digits in ascending order 0, 2, 4, 5, 8.

● Now interchange 0 and the next digit to get the smallest number 20,458.

● Therefore the smallest 5-digit number using the digits 4, 8, 0, 2, 5 without repeating is 20,458.

How to form smallest 5-digit number using given five digits with one of the digits as zero ?

Zero cannot take ten thousands place, it becomes a 4-digit number.

4, 8, 0, 2, 5
02,458
20,458   smallest 5-digit number

● Write the given digits in ascending order.

● Now interchange 0 and get the next digit to get the smallest number.

The preceeding and the succeeding numbers of given 5-digit number

Let us find the preceeding and succeeding numbers of a given 5-digit number.

The Preceeding number (one less than the number)	The number	The succeeding number (one more than the number)
83,652	83,653	83,654
25,047	25,048	25,049
46,789	46,790	46,791
19,999	20,000	20,001

Skip numbers
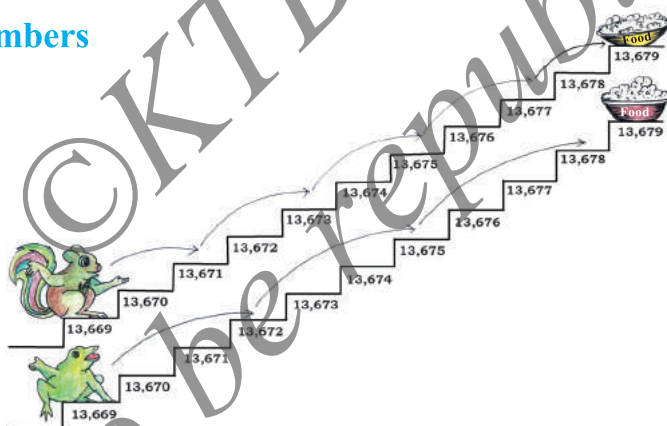
Each step is numbered as shown in figure. A squirrel and a frog are on 13,669[th] step. Squirrel can jump two steps and frog can jump three steps forward at a time. Which of them is going to get the food which is kept at 13,679[th] step ?

The steps on which frog jumps are ———— , ———— , ———— ,

The steps on which squirrel jumps are ———— , ———— , ———— ,

———— , ———— .

The steps on which frog jumps, make skip numbers of 3.

The steps on which squirrel jumps make skip numbers of 2.

Example 1

Write the skip numbers for the following.

1. 23,450 , 23,700 , 23,950, _____ , _____ .

   The difference between 23,700 and 23,450 is 250.

   The difference between 23,950 and 23,700 is 250.

   ∴ Add 250 to get next skip number.
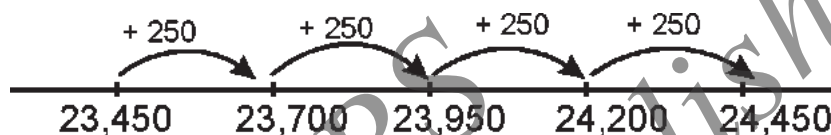
23,950 + 250 = 24,200. 24,200 is next skip number.

24,200 + 250 = 24,450 is last skip number.

Fill two skip numbers 24,200 and 24,450 in the blanks.

∴ 23,450, 23,700, 23,950, 24,200, 24,450

Example 2

Write the skip numbers for the following.

1. 25,017 , 35,017 , _____ , _____ , 65,017.

   The difference between 35,017 and 25,017 is 10,000.

Add 10,000 to get next skip numbers.
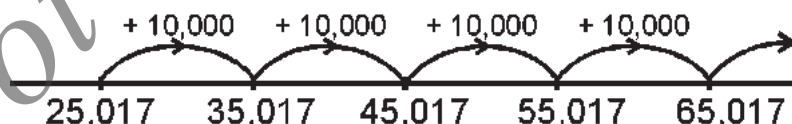
35,017 + 10,000 = 45,017. 45,017 is the next skip number.

45,017 + 10,000 = 55,017. 55,017 is the fourth skip number.

The third and fourth skip numbers are 45,017 and 55,017.

To identify the smallest and the greatest of given 5-digit numbers

Example 1

Which is the smaller number between 52,428 and 81,214 ?

Compare the digits in ten thousands place.

Digits in ten thousands places are 5 and 8.

5 is smaller than 8.

Therefore 52, 428 is smaller than 81,214.

Example 2

Which is the greater number between 12,234 and 11,484 ?

In the given numbers, if the digits in ten thousands place are the same, then compare thousands place digits.

Here the digits in ten thousands places are same. Compare the digits in thousands place.

Digits in thousands place are 2 and 1.

2 is greater than 1.

Therefore, 12,234 is greater than 11,484.

Arranging 5-digit numbers in ascending order

Example 1

Write 36,719 , 36,952 , 35,418 , 43,709 , 45,187 in ascending order.

- Compare the digits in ten thousands place. If the digits in ten thousands place are same, then compare the digits in thousands place.

- Write the given numbers in ascending order.
  35,418, 36,719, 36,952, 43,709, 45,187 are in ascending order.

Example 2

Arranging 5-digit numbers in desending order

Write 57,093, 52,169, 54,917, 57,298, 58,791 in the descending order.

- First, compare the digits in ten thousands place. If the digits in ten thousands place are same, then compare the digits in thousands place.

- Arrange the given numbers in descending order.

58,791; 57,298; 57,093; 54,917; 52,169 are in descending order.

Exercise 1.1

I. Insert commas at appropriate places in the following numbers. Write in words.

1) 32894   2) 18415   3) 99999   4) 40003

II. Write the following numbers in figures using commas.

1) Forty five thousand six hundred eighteen.

2) Eighty two thousand three.

3) Thirteen thousand seven hundred nine.

4) Ninety four thousand three hundred fourteen.

III. Write the following numbers in the expanded form.

Example : $47,609 = 4 \times 10,000 + 7 \times 1,000 + 6 \times 100 + 0 \times 10 + 9 \times 1$

1) 19,203

2) 77,777

3) 38,294

IV. Write the following expanded form of numbers in the standard form.

Example : $6\times10,000+1\times1,000+7\times100+9\times10+5\times1=61,795$

1) $7 \times 10,000 + 2 \times 1,000 + 8 \times 100 + 3 \times 10 + 8\times1 =$

2) $4 \times 10,000 + 0 \times 1,000 + 0 \times 100 + 0 \times 10 +1\times1 =$

3) 6×ten thousand+3×thousand+5×hundred+1×ten+7×unit=

4) 1×ten thousand+1×thousand+4×hundred+7×ten+4×unit =

V. Form the greatest and the smallest 5-digit numbers using the following digits without repetition.

Example :		Greatest	Smallest
1)	3, 1, 4, 7, 9	97431	13479
2)	8, 1, 6, 2, 5		
3)	7, 0, 6, 1, 3		
4)	6, 4, 5, 7, 0		
5)	2, 5, 7, 3, 4		

VI. Complete the table.

	Preceeding number	Number	Succeeding number
1)		57,839	
2)	18,375		
3)			40,781
4)		88,890	
5)			13,586

VII. Follow the pattern and complete the series.

1) 23,344,   23,444,   23,544, _____,   _____ .

2) 15,790,   35,790,   55,790, _____ ,   _____ .

3) 88,888,   78,888,   68,888,   _____ ,   _____ .

4) 30,453,   _____ ,   36,453,   39,453,   _____ .

5) 58,600,   62,600,   66,600,   _____ ,   _____ .

VIII. Write the following numbers in increasing order (Ascending order)

1) 30,435,   70,533,   20,411,   40,623.

2) 44,444,   44,044,   40,444,   40,044.

3) 63,841,   63,481,   63,148,   63,184.

4) 50,060,   50,500,   55,000,   50,006.

5) 20,325,   20,825,   20,302,   20,413.

IX. Write the following numbers in decreasing order (Descending order)

1) 23,456 ,   34,567,   12,345,   45,678.

2) 40,564 ,   45,064,   45,604,   40,456.

3) 12,344,   12,340,   12,304,   13,244.

4) 77,770,   77,077,   77,777,   70,777.

5) 61,234,   62,134,   21,364,   12,364.

X. Compare the following given numbers. Write =, > or < sign in the blanks.

1) 52,085 _____ 52,085.

2) 46,431 _____ 43,613.

3) 15,662 _____ 24,672.

4) 74,312 _____ 76,312.

5) 81,884 _____ 81,365.

Unit - 2

ADDITION

After studying this unit you can,
- add the given 5-digit numbers without carrying,
- add the given 5-digit numbers with carrying,
- solve verbal problems based on addition of 5-digit numbers.

Let us recall what we have learnt about addition of two or more 4 – digit numbers.

Revision Exercise

I. Add the following numbers.

1) $4,368 + 2,521$

2) $2,673 + 5,134$

3) $3,653 + 4,213 + 1,156$

4) $1,345 + 2,463 + 564$

II. Solve the following problems.

1. Sanmati deposited ₹ 3,672 on Monday and ₹ 4,678 on Tuesday in the bank. Find the total amount deposited by her.

2. The population of a village is 3,389. The population of another village is 4,893. Find the total population of both the villages.

3. The number of students of first standard in all the schools of a panchayat is 1,673, second standard is 1,845, third standard is 1,437 and fourth standard is 1,547. Find the total number of students.

Do You Know ?

You can add the two numbers in any order but the total remains the same. Try the above problems for verification.

Addition of 5-digit numbers without carrying.
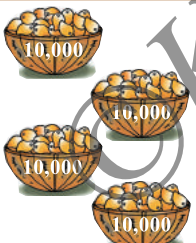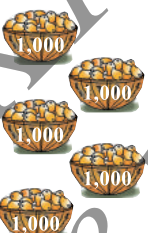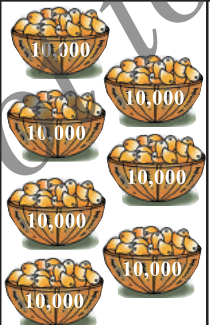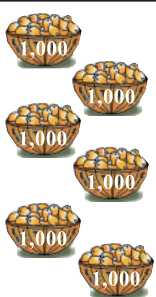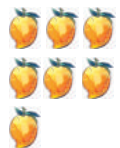
Addition of 5-digit numbers is same as that of addition of 4-digit numbers.

Recall that the digits are added in this order - units, tens, hundreds, thousands and ten thousands.

Example 1

Add the numbers 45,237 and 31,210.

Let us represent the addition of these two numbers through pictures as shown below.

	Ten Thousands (Ten Th)	Thousands (Th)	Hundreds (H)	Tens (T)	Units (U)
+					
=					
	7	6	4	4	7

Observe the two numbers written in the place value chart. The digits in each place are added.

	4 ten thousand	5 thousand	2 hundred	3 ten	7 unit
+	3 ten thousand	1 thousand	2 hundred	1 ten	0 unit
=	7 ten thousand	6 thousand	4 hundred	4 ten	7 unit

Observe the column addition of the above two numbers

		Ten Th	Th	H	T	U
Addends		4	5	2	3	7
Addends	+	3	1	2	1	0
Sum	=	7	6	4	4	7

Steps involved in addition

1) Write the digit of the numbers in vertical column according to their places.

2) Add digits in the units place. $7 + 0 = 7$. Write 7 in units place.

3) Add digits in the tens place. $3 + 1 = 4$. Write 4 in tens place.

4) Add digits in the hundreds place. $2 + 2 = 4$. Write 4 in hundreds place.

5) Add digits in the thousands place. $5 + 1 = 6$. Write 6 in thousands place.

6) Add digits in the ten thousands place. $4 + 3 = 7$. Write 7 in tenthousands place.

Sum of 45,237 and 31,210 is 76,447.

Example 2

Find the sum of 23,567 and 34,131.

		Ten Th	Th	H	T	U
Addends		2	3	5	6	7
Addends	+	3	4	1	3	1
Sum	=	5	7	6	9	8

Example 3

Mr Mallappa purchased a scooter for himself and motor cycle for his son. The cost of the scooter is ₹ 34,221. The cost of the motor cycle is ₹ 35,678. Find the total amount paid by Mr. Mallappa to buy scooter and motor cycle.

The cost of the scooter = ₹ 34,221.

The cost of the motor cycle = ₹ 35,678.

The amount paid by Mr. Mallappa

= cost of the scooter + cost of the motor cycle.

= ₹ 34,221 + ₹ 35,678

= ₹ 69,899.

	Ten Th	Th	H	T	U
	3	4	2	2	1
+	3	5	6	7	8
=	6	9	8	9	9

∴ Total amount paid by Mr. Mallappa is ₹ 69,899.
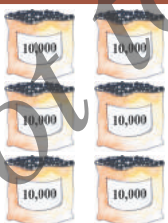
Addition of 5-digit numbers with carrying

Addition of 5-digit numbers with carrying is the same as that of addition of 4-digit numbers with carrying.

Example 1

Find the sum of 38,765 and 25,978.

Let us represent the addition of these two numbers with carrying through pictures as shown below.

	Ten Thousands	Thousands	Hundreds	Tens	Units
Carry					
+					
=					
	6	4	7	4	3

Observe the two numbers written in the place value chart. The digits in each place are added.

Observe the column addition of the above two numbers.

	Ten Th	Th	H	T	U
Carry	1	1	1	1	
	3	8	7	6	5
+	2	5	9	7	8
=	6	①4	①7	①4	①3
=	6	4	7	4	3

Steps involved in addition of two numbers with carrying.

1. Write the numbers in the vertical column according to the place of digits.

2. Add digits in the units place.   5 + 8 = 13. Write 3 in units place and carry 1 to tens place.

3. Add digits in the tens place.   1 + 6 + 7 = 14. Write 4 in tens place and carry 1 to hundreds place.

4. Add digits in the hundreds place.   1 + 7 + 9 = 17. Write 7 in hundreds place and carry 1 to thousands place.

5. Add digits in the thousands place.   1 + 8 + 5 = 14. Write 4 in thousands place and carry 1 to ten thousands place.

6. Add digits in the ten thousands place.   1 + 3 + 2 = 6. Write 6 in ten thousands place.

∴ sum of 38,765 and 25,978 is 64,743.

Example 2

Find the sum of 56,003 and 42,597.

	Ten Th	Th	H	T	U
Carry			1	1	
	5	6	0	0	3
+	4	2	5	9	7
=	9	8	6	0	0

∴ sum of 56,003 and 42,597 is 98,600.

How to add 5 digit numbers with carrying ?

* Write the numbers one below the other according to place of each digit.
* Start adding digits in units, tens, hundreds, thousands, ten thousands place.
* Wherever carrying is necessary carry the digit to the next higher place.

Example 3

A book seller sold 26,817 books in a book exhibition and sold 17,794 books in second book exhibition. Find the total number of books sold by him in both the book exhibitions.

The number of books sold in first book exhibition   = 26,817

The number of books sold in second book exhibition = 17,794

The total number of books sold in both the book exhibitions

	Ten Th	Th	H	T	U
Carry	1	1	1	1	
	2	6	8	1	7
+	1	7	7	9	4
=	4	4	6	1	1

= 26,817 + 17,794

= 44,611

∴ the total number of books sold = 44,611.

<div align="center">**Exercise 2.1**</div>

I. Find the sum of each of the following.

    1)   36,417 + 32,532

    2)   28,490 + 61,306

    3)   12,973 + 46,016

    4)   23,462 + 52,304

    5)   42,806 + 34,063

II. Find the sum of each of the following.

    1)   36,907 + 53,613

    2)   24,596 + 36,578

    3)   43,374 + 36,654

    4)   25,700 + 2,246 + 16,413

    5)   25,236 + 34,051 + 8,368

III. Solve the following problems.

    1)   There were 26,759 trees in the protected area of a forest. 13,842 trees were planted during vanamahostava. Find the total number of trees in the protected area of the forest.

    2)   A co-operative milk dairy collects 15,209 litres of milk from farmers in a week and 16,826 litres of milk in the next week. How many litres of milk was collected from the farmers in two weeks?

3) An Indian cricketer scored 14,025 runs in the test cricket matches and 15,759 runs in one day cricket matches. How many runs did the cricketer score in all ?

4) A public library in a city has 17,943 books in Kannada, 14,635 books in Hindi and 10,284 books in English. How many books are there in the library altogether ?

5) In an assembly election three candidates were polled 32,135 votes, 29,048 votes and 4,951 votes respectivety. Find the total number of votes polled.

Unit - 3

SUBTRACTION

After studying this unit you can,

- subtract the given 5-digit number from another 5-digit number without borrowing,

- subtract the given 5-digit number from another 5-digit number with borrowing,

- subtract the given 4-digit number from a 5-digit number,

- solve verbal problems based on subtraction of 5-digit numbers.

Let us recall what we have learnt about subtraction of 4-digit numbers.

Revision Exercise

I. Subtract the following numbers.

 1) 4,528 - 3,214

 2) 6,453 - 5,302

 3) 3,759 - 2,156

II. Subtract the following numbers.

 1) 6,123 - 3,586

 2) 8,000 - 4,617

 3) 3,564 - 1,345

III. Solve the following problems.

 1) A factory manufactured 8,534 boxes. Out of them 5,421 boxes were sold out. Find the remaining number of boxes.

2) The total number of students of standard five in all the schools of a taluk is 5,728. If the number of girls is 3,572, find the number of boys in the schools.

3) Sanjeev has ₹ 8,524. He donated ₹ 2,937 to an orphanage charitable trust. How much amount is left with him ?

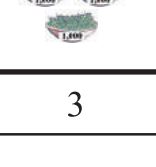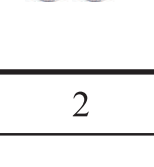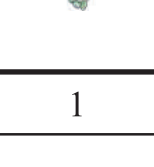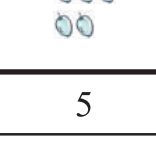## Subtraction of 5-digit numbers without borrowing.
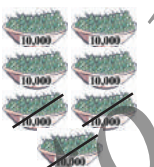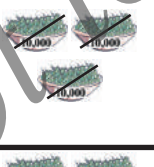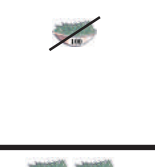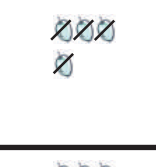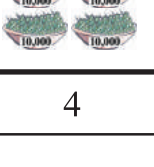
Subtraction of 5-digit numbers is the same as that of subtraction of 4-digit numbers.

Recall that the digits are subtracted in this order – units, tens, hundreds, thousands and ten thousands.

Example 1

Find the difference between 75,389 and 32,174

Let us represent subtraction of these two numbers through pictures as shown below.

	Ten Thousands	Thousands	Hundreds	Tens	Units
-					
=					
	4	3	2	1	5

Observe the two numbers written in the place value chart. The digits in each place are subtracted.

	7 ten thousand	5 thousand	3 hundred	8 ten	9 unit
-	3 ten thousand	2 thousand	1 hundred	7 ten	4 unit
=	4 ten thousand	3 thousand	2 hundred	1 ten	5 unit

Observe the column subtraction of the above two numbers.

Steps involved in subtraction.

1) Write the numbers in the vertical column according to the place of each digit.

2) Subtract digits in the units place. $9 – 4 = 5$. Write 5 in units place.

3) Subtract digits in the tens place. $8 – 7 = 1$. Write 1 in tens place.

4) Subtract digits in the hundreds place. $3 – 1 = 2$. Write 2 in hundreds place.

5) Subtract digits in the thousands place $5 – 2 = 3$. Write 3 in thousands place.

6) Subtract digits in the ten thousands place. $7 – 3 = 4$. Write 4 in ten thousands place.

The difference between 75,389 and 32,174 is 43,215.

		TenTh	Th	H	T	U
Minuend		7	5	3	8	9
Subtrahend	-	3	2	1	7	4
Difference	=	4	3	2	1	5

Example 2

Subtract 26,235 from 39,637.

Solution :

    a.   Here 26,235 is subtrahend and 39,637 is minuend.

    b.   Write 39,637 in first row and 26,235 below it in second row according to the place value of the digits.

    c.   Now subtract.

		Ten Th	Th	H	T	U
Minuend		3	9	6	3	7
Subtrahend	-	2	6	2	3	5
Difference	=	1	3	4	0	2

Verification

		Ten Th	Th	H	T	U
Difference		1	3	4	0	2
Subtrahend	+	2	6	2	3	5
Minuend	=	3	9	6	3	7

> **Do You Know ?**
>
> Subtraction can be verified by adding difference and subtrahend. It should be equal to the minuend.

Verify answers of subtraction for example 1 and all other problems on subtraction.

Example 3

A coconut merchant purchased 49,137 coconuts. He sold 26,134 coconuts in a month. How many coconuts are left unsold ?

Number of coconuts purchased by the merchant   =   49,137

Number of coconuts sold in a month   =   26,134

∴ Number of coconuts unsold = 49,137 - 26,134 =   23,003

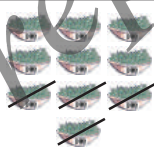|	Ten Th	Th	H	T	U
	4	9	1	3	7
-	2	6	1	3	4
	2	3	0	0	3

∴ 23,003 coconuts are unsold
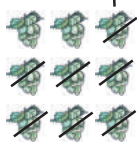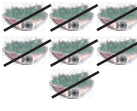
Subtraction of 5-digit numbers with regrouping or borrowing.

Subtraction of 5-digit numbers with regrouping or borrowing is the same as that of subtraction of 4-digit numbers by regrouping or borrowing.

Example 1

Find the difference between 57,394 and 26,765.

Let us represent the subtraction of these two numbers through pictures as shown below.

	Ten Thousands	Thousands	Hundreds	Tens	Units
57,394					
-26,765					
30,629					
	3	0	6	2	9

Observe the column subtraction of the above numbers

	Ten Th	Th	H	T	U
	5	7	3	9	4
-	2	6	7	6	5
=					

After regrouping the hundreds and units places

	Ten Th	Th	H	T	U
After Regrouping		6	13	8	14
	5	7	3	9	4
-	2	6	7	6	5
=	3	0	6	2	9

Steps involved in subtraction of two numbers with borrowing.

1. Write the numbers in the vertical column according to place of the digits.

2. In units place minuend is 4 and subtrahend is 5. Since 4 is smaller than 5, 5 cannot be subtracted from 4. So borrow 1 ten from tens place. So units place can be rewritten as 1 ten + 4 units

= 10 units + 4 units

= 14 units.

Now subtract units place digits. i.e., 14 − 5 = 9. Write 9 in units column.

3. After borrowing 1 ten to units place, tens place is left with 8 tens.

   Subtract : 8 – 6 = 2. Write 2 in tens column.

4. In hundreds place, 3 is less than 7. So 7 cannot be subtracted from 3.

   Hence borrow 1 thousand from thousands place. 1 thousand = 10 hundreds.

   The hundreds place can be rewritten as 10 hundreds + 3 hundreds = 13 hundreds.

Now subtract hundreds place digits i.e., 13 – 7 = 6. Write 6 in hundreds column.

5. After borrowing 1 thousand, thousands place is left with 6 thousands.

   Subtract : 6 - 6 = 0. Write 0 in thousands column.

6. Subtract : 5 - 2 = 3. Write 3 in ten thousands column.

   ∴ The difference between 57,394 and 26,765 is 30,629.

Verification of subtraction

		Ten Th	Th	H	T	U
Difference		3	0	6	2	9
Subtrahend	+	2	6	7	6	5
Minuend	=	5	7	3	9	4

Example 2

Subtract 73,649 from 90,000.

In these numbers 73,649 is subtrahend and 90,000 is minuend. Now, we have to find the difference between 90,000 and 73,649.

		Ten Th	Th	H	T	U
Minuend		9	0	0	0	0
Subtrahend	-	7	3	6	4	9
Difference	=					

After regrouping

	Ten Th	Th	H	T	U
After Regrouping	8	9	9	9	10
	9̸	0̸	0̸	0̸	0̸
-	7	3	6	4	9
=	1	6	3	5	1

Verification

		Ten Th	Th	H	T	U
Difference		1	6	3	5	1
Subtrahend	+	7	3	6	4	9
Minuend	=	9	0	0	0	0

Example 3

Last year 16,986 kg of rice was consumed for midday meals of primary school students. This year it is 21,482 kg of rice. How many more kg of rice is used this year ?

Quantity of rice used to cook for children this year = 21,482 kg

Quantity of rice used to cook for children last year = 16,986 kg

∴ Increase in quantity of rice used this year = 21,482–16,986 kg

= 4,496 kg

∴ 4,496 kg of more rice is used to cook for primary school students this year.

Verification

		Ten Th	Th	H	T	U
Difference			4	4	9	6
Subtrahend	+	1	6	9	8	6
Minuend	=	2	1	4	8	2

Example 4

The workers of a tea factory have to fill 48,342 packets of tea powder in a day. They had filled 33,675 packets before lunch time, find the remaining packets to be filled.

Number of packets to be filled with tea in a day = 48,342.

Number of packets filled with tea before lunch time = 33,675.

The number of tea packets to be filled = 48,342-33,675

= 14,667

∴ Remaining packets to be filled = 14,667.

Exercise 3.1

I. Find the difference of the following

1) 59,842 - 34,532

2) 86,291 - 64,130

3) 41,297 - 16,025

4) 25,768 - 4,304

5) 17,094 - 3,043

II. Find the difference of the following

1) 42,695 - 20,746

2) 50,625 - 36,178

3) 40,000 - 16,543

4) 25,307 - 6,419

5) 20,000 - 8,625

III. Subtract.

1) 16,486 from 26,475

2) 36,279 from 52,367

3) 10,000 from 31,579

4) 24,683 from 40,000

5) 4,297 from 11,035

III. Solve the following problems.

1) What should be added to 37,946 to get 91,643 ?

2) What should be subtracted from 67,215 to get 28,941 ?

3) The sum of two numbers is 87,065. If one of the number is 49,726, find the other number.

4) A farmer yielded 38,462 coconuts from his field last year. This year he yielded 47,285 coconuts. Find how many more coconuts he yielded this year ?

5) In an assembly election, Mr.Suresh has got 42,618 votes. Mrs. Rohini got 54,951 votes and won. How many more votes did Mrs. Rohini get than Mr. Suresh ?

Problems involving both addition and subtraction operations.

Example 1

Solve : 22,457 + 32,986 - 35,712

First perform addition of 22,457 and 32,986.

	Ten Th	Th	H	T	U
Carry			1	1	1
	2	2	4	5	7
+	3	2	9	8	6
=	5	5	4	4	3

Now subtract 35,712 from the sum of 22,457 and 32,986

	Ten Th	Th	H	T	U
After Regrouping	4	14	14		
	5̶	5̶	4̶	4	3
-	3	5	7	1	2
=	1	9	7	3	1

∴ 22,457 + 32,986 – 35,712 = 19,731

Example 2

The co-operative milk dairy collects 15,684 litres of milk from village A and 17,324 litres of milk from village B. If the co-operative dairy sells 20,263 litres of milk, find the quantity of remaining milk.

Quantity of milk collected from village A = 15,684 litres.

Quantity of milk collected from village B = 17,324 litres.

∴ Total quantity of milk collected from
both the villages = 15,684+17,324 litres

= 33,008 litres.

Quantity of milk sold by the dairy = 20,263 Litres

Quantity of milk left with the
co-operative dairy = 33,008 - 20,263 litres

= 12,745 litres.

∴ Quantity of milk remaining = 12,745 litres.

Example 3

A petrol bunk had 96,321 litres of petrol. 26,841 litres of petrol was sold on Monday and 35,769 litres of petrol was sold on Tuesday. Find the remaining quantity of petrol in the petrol bunk.

Stock of petrol in the petrol bunk = 96,321 litres

Quantity of petrol sold on Monday = 26,841 litres

Quantity of petrol sold on Tuesday = 35,769 litres

Total quantity of petrol sold in 2 days = 26,841 + 35,769 litres

= 62,610 litres

∴ Quantity of petrol left in the petrol bunk = 96,321 - 62,610 litres

= 33,711 litres

∴ 33,711 litres of petrol is remaining in the petrol bunk.

I. Solve.

1)   54,398 + 24,897 - 39,486

2)   43,618 + 6,382 - 29,467

3)   21,679 + 27,428 -   2,438

II. Solve the following problems.

1)   A mobile phone factory manufactures 23,715 mobiles in November and 34,160 mobiles in December. Out of them 42,534 mobiles were sold. Find how many mobiles are left unsold in the factory.

2)   Mr. Anand has ₹ 15,282 in his bank account. He deposits ₹ 25,718 on Wednesday. He withdraws ₹ 30,145 on Thursday. Find his bank balance after withdrawal.

3)   Mrs. Anita has ₹ 50,000 with her. She purchases a colour T.V. for ₹13,538 and a refrigerator for ₹ 16,990. Find the amount left with her after the purchase.

4)   60,000 school uniforms are provided for school children of a district. 12,372 and 23,003 uniforms were distributed to schools of two taluks of the district. Find how many uniforms are remaining.

Unit - 4

FACTORS AND MULTIPLES

After studying this unit you can,

- explain the meaning of factors of a given number,

- identify factors of a given number,

- find the factors of a given number,

- draw tree diagram to represent the factors of a given number,

- explain the meaning of multiples of a given number,

- find the multiples of a given number,
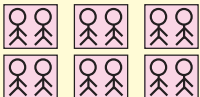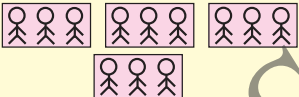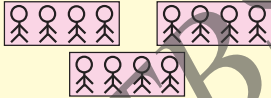
- identify multiples of a given number.
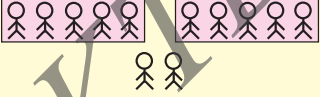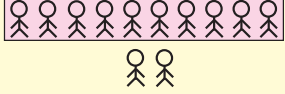
Factors and Multiples of a number

Example 1

Consider the game called "grouping together." There are twelve students in the game.

Students are moving in a circular path. A number is announced. Students make groups having the number of members announced. Students who form groups with more or less than the announced number are treated as out.

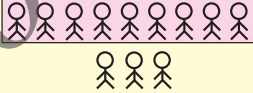| Number announced	Groups formed	Number of groups	Members left out
1		12	0
2		6	0
3		4	0
4		3	0
5		2	2
6		2	0
7		1	5
8		1	4
9		1	3
10		1	2
11		1	1
12		1	0

Observe the above table and complete the following table.

The numbers announced where no group members were left out.	The numbers announced where some group members were left out.
1,2,……………………..	5,……………………..

Numbers in the first column are factors of 12.

1, 2, 3, 4. 6 and 12 are factors of 12.

Numbers in the second column are not factors of 12.

5, 7, 8, 9, 10, 11 are not factors of 12.

If 1, 2, 3, 4, 6 and 12 are factors of 12 then,

what is 12 called with respect to 1, 2, 3, 4, 6, and 12 ?

Observe the following table.

1	$\times$ 12	=	12
2	$\times$ 6	=	12
3	$\times$ 4	=	12
4	$\times$ 3	=	12
6	$\times$ 2	=	12
12	$\times$ 1	=	12

12 is called the **multiple** of 1, 2, 3, 4, 6 and 12

Consider $3 \times 8 = 24$. 3 and 8 are factors of 24 and 24 is multiple of 3 and 8.

Therefore, factors and multiples are related to each other.

Example 2

Multiply and complete the table.

×	1	2	3	4	5	6	7	8	9	10	11	12
1												12
2						12						
3				12								
4			12									48
5												
6		12						48				
7												
8						48						
9												
10												
11												
12	12			48								

The numbers of the first row are 1,2,3, 4, 5,6, 7, 8, 9, 10 ,11 and 12. These numbers are multiples of 1.

The numbers in second row are 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22 and 24. These numbers are multiples of 2.

List the multiples of 7, 9 and 11.

Observe the following examples

1 is a multiple of 1. $1 \times 1 = 1$

2 is a multiple of 2. $2 \times 1 = 2$

6 is a multiple of 6. $6 \times 1 = 6$

9 is a multiple of 9. $9 \times 1 = 9$

11 is a multiple of 11. $11 \times 1 = 11$

From the above examples we can conclude that,

every number is a multiple of itself.

Observe the following examples.

1 is a multiple of 1. $1 \times 1 = 1$

2 is a multiple of 1. $1 \times 2 = 2$

5 is a multiple of 1. $1 \times 5 = 5$

10 is a multiple of 1. $1 \times 10 = 10$

15 is a multiple of 1. $1 \times 15 = 15$

From the above examples we can conclude that,

every number is a multiple of 1.

Example 3

Which are the two numbers to be multiplied to get the product 8 ?

$1 \times 8 = 8$, $2 \times \boxed{} = 8$, $4 \times \boxed{} = 8$, $8 \times \boxed{} = 8$

The factors of 8 are 1, 2, 4 and 8.

Example 4

Find the factors of 48

$1 \times 48 = 48$, $2 \times \boxed{} = 48$, $3 \times \boxed{} = 48$, $4 \times \boxed{} = 48$

$6 \times 8 = 48$, $8 \times \boxed{} = 48$, $12 \times \boxed{} = 48$, $16 \times \boxed{} = 48$

$24 \times \boxed{} = 48$, $48 \times \boxed{} = 48$

$\therefore$ The factors of 48 are 1, 2, 3, 4, 6, 8, 12, 16, 24 and 48.

We can conclude that, when two or more numbers are multiplied to get the product, the numbers multiplied are called factors of the product.

Observe the following table :

Multiple	Factor	Division	Remainder
48	2	$48 \div 2 = 24$	Zero
48	3	$48 \div 3 = 16$	Zero
48	8	$48 \div 8 = 6$	Zero
48	12	$48 \div 12 = 4$	zero

We can conclude that, a number is a factor of the given number if it divides the given number completely leaving zero as remainder.


DO YOU KNOW ?

If the sum of all the factors of a given number is equal to twice the number, then the number is called a perfect number. Factors of 6 are 1, 2, 3 and 6. Sum of all factors of 6 is $1+2+3+6 = 12$ Twice the number $= 2 \times 6 = 12$. So, the first perfect number is 6. Find the other perfect numbers.

FACTOR TREE

Any number can be expressed as product of two numbers (factors). This can be represented diagrammatically by factor tree as follows.

Example 1

Write the factor tree of 24.
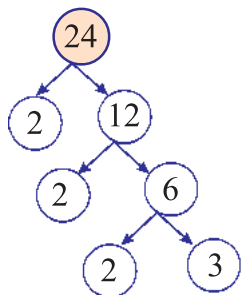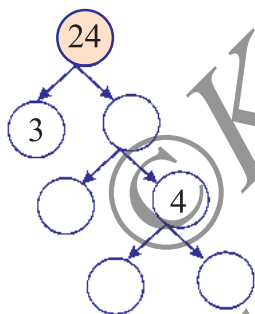
$$24 = 2 \times 12$$

$$24 = 2 \times 2 \times 6$$

$$24 = 2 \times 2 \times 2 \times 3$$

$$\therefore 24 = 2 \times 2 \times 2 \times 3$$

Example 2
Complete the following factor tree.
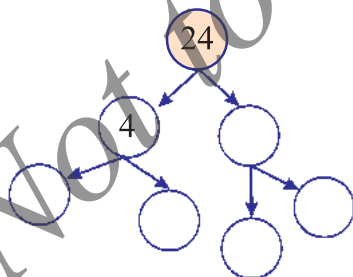
$$24 = 3 \times 8$$

$$24 = 3 \times \square \times \square$$

$$24 = 3 \times \square \times \square \times \square$$

$$\therefore 24 = 3 \times \square \times \square \times \square$$

Example 3
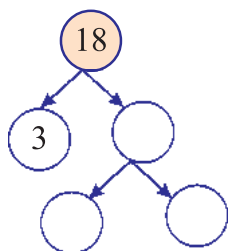
Complete the following factor tree.

$$24 = 4 \times 6$$

$$24 = \square \times \square \times \square \times \square$$

$$\therefore 24 = \square \times \square \times \square \times \square$$

∴ Factor tree for a given number can be started with any two factors.
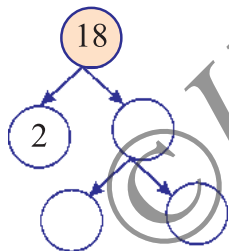
Example 4

Write the factor tree of 18.

$18 \quad = \quad 3 \times 6$

$18 \quad = 3 \times \Box \times \Box$

$\therefore \ 18 \quad = 3 \times \Box \times \Box$

Example 5

Complete the factor tree of 18.

$18 \quad = \quad 2 \times 9$

$18 \quad = 2 \times \Box \times \Box$

$\therefore \ 18 \quad = 2 \times \Box \times \Box$

Factor tree can be written in different ways by taking different factors.

Points to remember

1. Every number is multiple of 1.

2. Multiple of a number is either equal to or greater than the number.

3. 1 is a factor of every number.

4. Every number is a factor of itself.

Exercise 4.1

1) Circle the multiples of 4 with blue colour, cross the multiples of 6 with red colour and underline the multiples of 9 with a pencil.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

2) Circle the multiples of 7 in the following numbers.

7, 13, 14, 21, 22, 35, 36, 42 and 45

3) Circle the multiples of 12 in the following numbers.

6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72

4) Write the multiples of 2 between the numbers 50 and 60.

5) Write the multiples of 15 between the numbers 50 and 100.

6) Write five multiples of the following numbers.

15, 17, 19 and 23

7) Find which of the following numbers are factors of 24 ?
   1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18, 20, 22 and 24

8) Write any two factors of the following numbers.
   6, 18, 28, 36, 42, 48

9) Write all the factors of the following numbers.
   9, 13, 20, 26, 40

10) Write the factor tree for the following numbers.
    12, 20, 28, 32 and 36

11) Complete the following factor tree by writing missing numbers.

(i)

(ii)
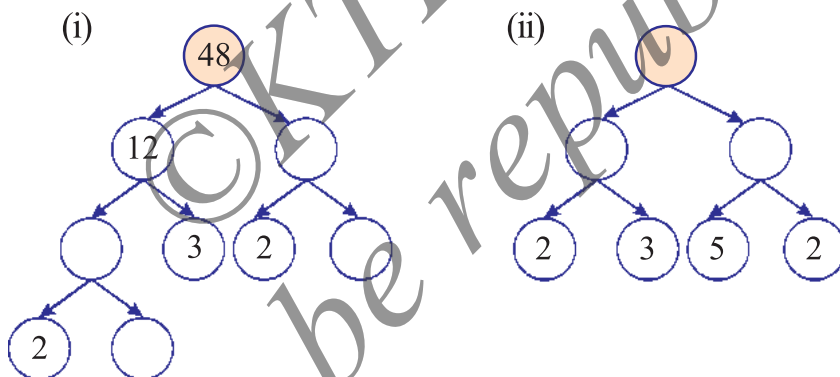
Chapter - 5
FRACTIONS

After studying this Chapter you can,

- explain the meaning of fraction,

- write fraction for the given situation,

- give examples for fractions,

- compare the fractions having,

  a) equal denominators   b) equal numerators.

- identify the greater or smaller fractions,

- explain the meaning of equivalent fraction,

- write equivalent fractions for a given fraction,

- identify equivalent fractions,

- locate $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}$ on the number line,

- estimate the degree of closeness of a given fraction,

- simplify the larger unit fractions into smaller unit fraction (dividing by common number).
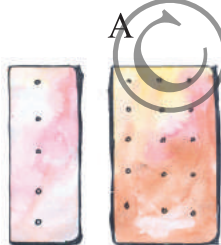
Fraction as a part of the whole.
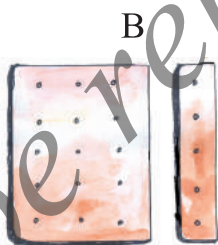
Example 1

When you say **'half- half'**, into how many parts are you going to break the whole ? Two parts.

Two halves make one whole.

Study the pairs given below.
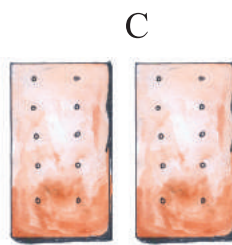
A   B   C

Two unequal parts   Two unequal parts   Two equal parts

Which ones do you call halves . Why ?

In fig C, the whole is divided into two equal parts.

Each part is a half.

Half is expressed as $\frac{1}{2}$.

Example 2

Look at these circular cutouts. Each has been divided into four parts. Is there any difference in the way they have been divided?
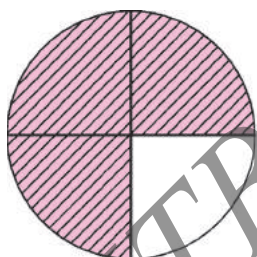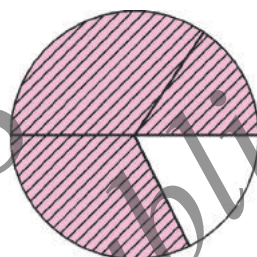

fig 2(a)   fig 2(b)

In fig 2(a) we can choose any part and say that it is one-fourth of the circular cutout, as equal parts are made.

Can we do the same in fig 2 (b) ? ……………… No. Why ?

> The important point is that, to express a fraction as part of a whole, we must divide the whole into equal parts.

Example 3

 Look at the rectangle. What portion of the rectangle is coloured green ?

It is one out of the three. Here, the whole rectangle is divided into 3 equal parts.
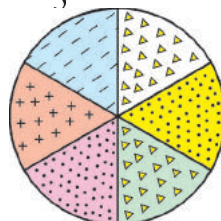
One such equal part is coloured green. It is written as $\frac{1}{3}$

Example 4

Look at this circle.

Into how many equal parts is the circle divided ?

It is divided into 6 equal parts.

How many parts of the circle are marked with plus sign (+) ?

It is one out of six parts. It is written as $\frac{1}{6}$.

How many parts of the circle are marked with dots ?

It is two out of six. It is written as $\frac{2}{6}$.

Numerator and Denominator

Look at the fractions : $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$

A fraction consists of two numbers written one above the other, separated by a line. The number above the line is called the **numerator** and the number below the line is called the **denominator**.

$$\frac{\text{Numerator}}{\text{Denominator}} \quad \frac{1}{2}, \frac{1}{4}, \frac{1}{8}$$

A cake is divided into 8 equal parts. One equal part is represented as $\frac{1}{8}$.

$\frac{1}{8}$ is a fraction. The total number of parts is the denominator. The part taken out is 1. This is represented as the numerator.
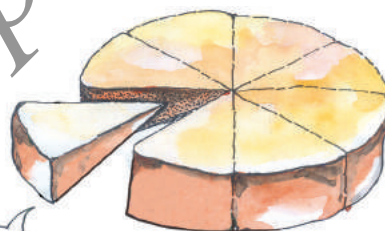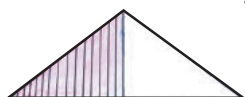
$$\frac{1}{8} \quad \begin{array}{l} \rightarrow \quad \text{Numerator} \\ \rightarrow \quad \text{Denominator} \end{array}$$

In this figure 1 out of 4 equal parts is coloured.

$$\frac{1}{4} \quad \begin{array}{l} \rightarrow \quad \text{Numerator} \\ \rightarrow \quad \text{Denominator} \end{array}$$

Observe the triangle given below.

$$\frac{\text{No. of coloured parts}}{\text{Total no. of equal parts made}} = \boxed{\frac{1}{2}} \begin{array}{l}\rightarrow \text{Numerator} \\ \rightarrow \text{Denominator}\end{array}$$

$$\frac{\text{No. of uncoloured parts}}{\text{Total no. of equal parts made}} = \boxed{\frac{1}{2}} \begin{array}{l}\rightarrow \text{Numerator} \\ \rightarrow \text{Denominator}\end{array}$$

From these examples we conclude that,

- Fraction is a part of a whole.

- To write a fraction we need two numbers.

- The number of equal parts into which the whole is divided, forms the denominator.

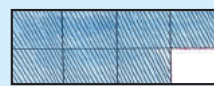- The number of equal parts selected or shaded, forms the numerator.

$$\frac{3}{4} \begin{array}{l}\rightarrow \text{Numerator} \\ \rightarrow \text{Denominator}\end{array} \begin{array}{l}\leftarrow \\ \leftarrow\end{array} \frac{7}{8}$$

Three by four   Seven by eight

Fraction as a part of collection

Example 1

This is a collection of 10 labels. Divide this collection into two equal parts. Each of these parts will have 5 labels.
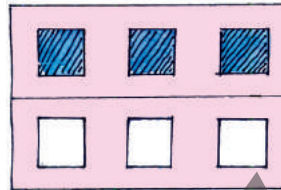
So $\frac{1}{2}$ of 10 is 5.

Example 2
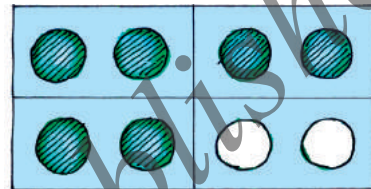
Study the fractional part of the following collections.

a) $\frac{1}{2}$ of this collection is coloured.

   $\therefore \frac{1}{2}$ of 6 is   3

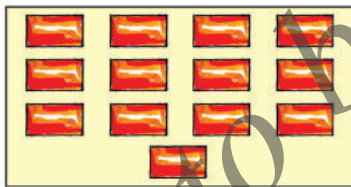b) $\frac{3}{4}$ of this collection is coloured

   $\therefore \frac{3}{4}$ of 8 is   6

c) $\frac{2}{3}$ of this collection is coloured.

   $\therefore \frac{2}{3}$ of 6 is   4

Example 3

Abdul has 13 piecs of Mysore paks in his plate. He gives 2 piecs of Mysore paks to his friend D' souza.

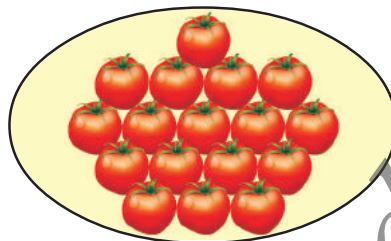Can you tell what part of Mysore paks does D'Souza get ? It is 2 out of 13.

Here 13 is total number in the collection. 2 is the number taken.

Therefore it can be represented by $\frac{2}{13}$.

It is read as two by thirteen or two thirteenth.

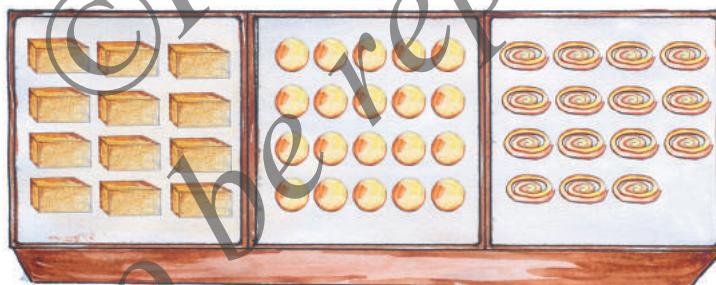## Example 4

Manohar sells tomatoes in his shop.

There are 17 tomatoes of equal size in the tray. He weighs half a kg tomatoes and gets 5 tomatoes. Can you tell what part of tomatoes does he get ? It is 5 out of 17.

Here 17 is the total number in the collection. 5 is the number of tomatoes taken.

Fraction   as a part of the Group

Example 1 :

This is Hari's sweet shop.

Mysore paks   Laddus   Jilebees.

What are the sweets available in Hari's sweet shop ?

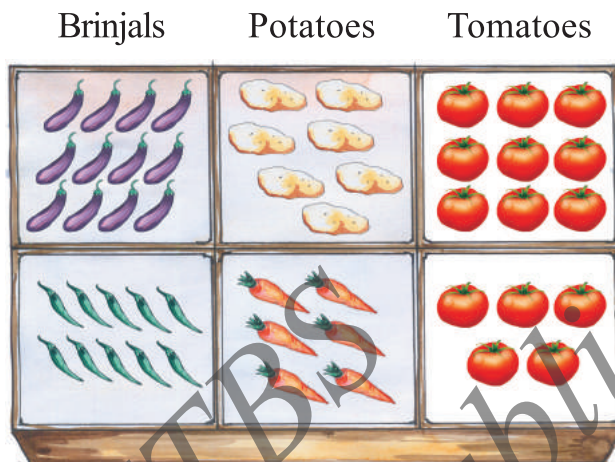On what part of the shelf does he keep Laddus ?

It is $\frac{1}{3}$ and read as one third or one by three.

Hari wants to sell $\frac{7}{20}$ of Laddus to Viju.

How many Laddus does Viju get ? It is 7.

Example 2

This is Mani's vegetable shop.

Brinjals   Potatoes   Tomatoes

Chillies   Carrots   Tomatoes

Which vegetable is kept in the largest area ? ....

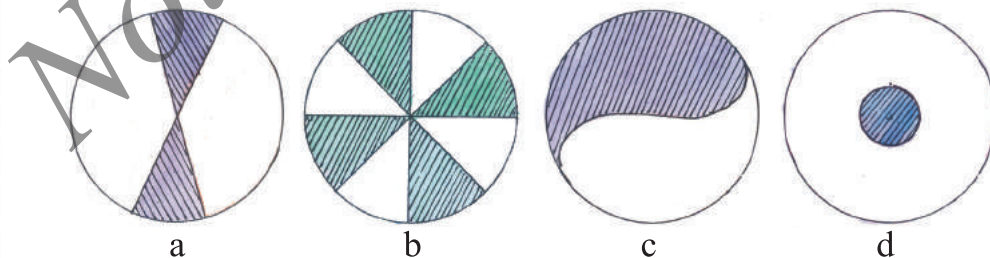What part is it ? .... It is $\dfrac{2}{6}$ or $\dfrac{1}{3}$

What part of the area is used to keep carrots ? It is $\dfrac{1}{6}$

From the above examples we conclude that, fraction is a part of a collection in a group.

Exercise 5.1

1) **Which of the following figures have been divided into parts of the same size ?**

a   b   c   d

2) Draw a line or lines to divide each of these figures into the required number of equal parts.

   2 parts   4 parts   6 parts   8 parts
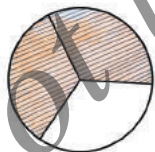
3) Write each of the following as a fraction.

  a) Half   f) Five-twelveth

  b) Two-third   g) Eight-nineth.

  c) Two-tenth   h) Four-nineth

  d) Five-seventh   i) Three-fourth

  e) Five-sixteenth   j) Two-fifth

4) Write each of the fraction in words.

a) $\dfrac{2}{5}$ b) $\dfrac{3}{4}$ c) $\dfrac{7}{10}$ d) $\dfrac{11}{12}$ e) $\dfrac{2}{3}$

f) $\dfrac{4}{5}$ g) $\dfrac{5}{8}$ h) $\dfrac{3}{7}$ i) $\dfrac{5}{6}$ j) $\dfrac{7}{9}$
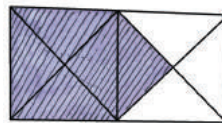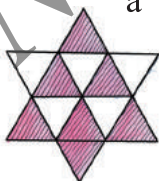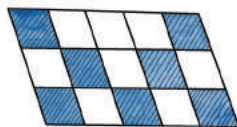
5) What fraction of the figure is shaded ?
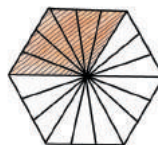

    a   b   c
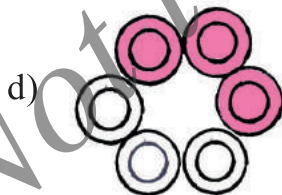
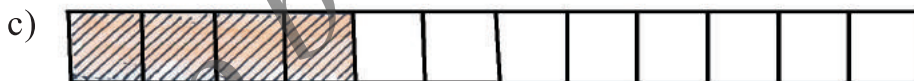   d   e   f

6) Fill in the blanks.

a) The denominator of the fraction $\frac{1}{8}$ is ……………

b) The numerator of the fraction $\frac{2}{5}$ is ……………

c) 3 is the…………………..of the fraction $\frac{1}{3}$.

d) 1 is the ………………of the fraction $\frac{1}{5}$.

e) In a fraction, the denominator is written below the …………….. separated by a line.

7) Write down the fraction of the coloured portions in these figures.

a)

b)

c)

d)

e)

8) Write the fraction for the shaded part in each of the following figures.

....
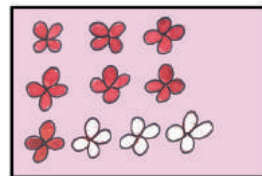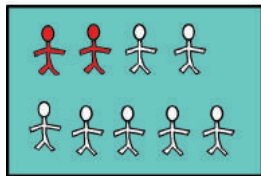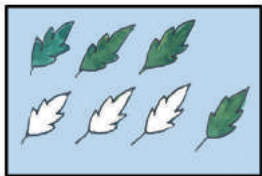
9) Colour the figures as instructed.

Example : Colour $\dfrac{3}{4}$

a. Colour $\dfrac{1}{5}$

b. Colour $\dfrac{2}{3}$

c. Colour $\dfrac{2}{9}$
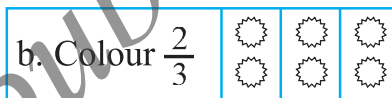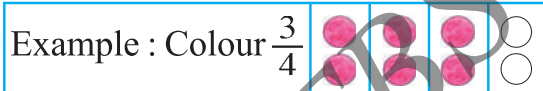
10) Represent the given fraction by drawing a line.

a) What is $\dfrac{1}{3}$ of 12 ?
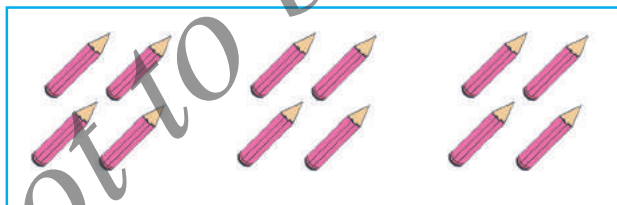
b) What is $\dfrac{2}{5}$ of 15 ?
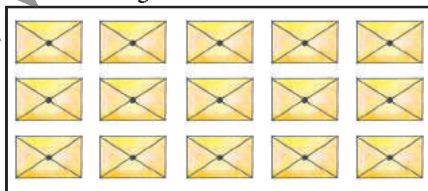
c) What is $\dfrac{2}{7}$ of 21 ?
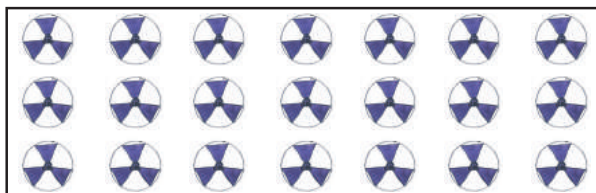
11) **Shade the figures to show the fractions.**
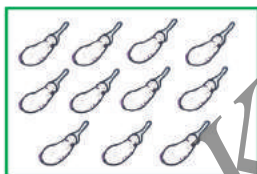
    a) $\dfrac{6}{11}$ b) $\dfrac{7}{20}$ c) $\dfrac{8}{15}$

12) **Which of the following shaded figures represent $\dfrac{4}{9}$?**

fig 1   fig 2   fig 3
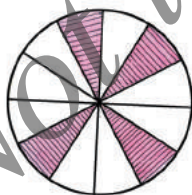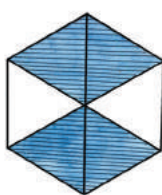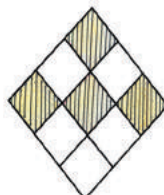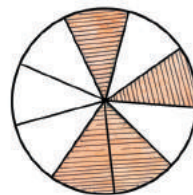
fig 4   fig 5   fig 6   fig 7

13) Which of the following shaded figures represent $\frac{5}{12}$? Discuss the reason.
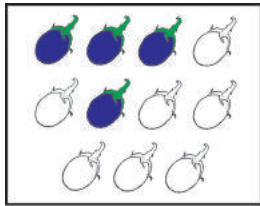
a
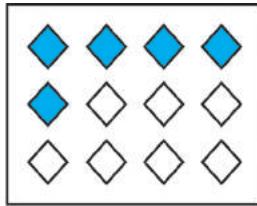
b
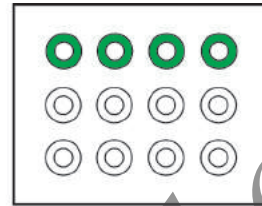
c
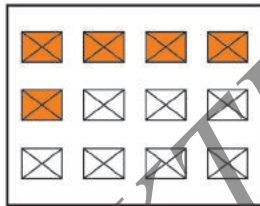
d
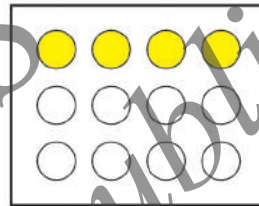
e

14) Represent the grouped parts as fractions.

Example → $\frac{3}{4}$

a)

b)

c)
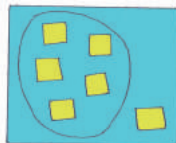
Comparison of fractions

Comparison of fractions having same denominators.

Example 1

Look at the shaded parts of the following figures.
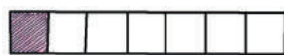
$$\frac{1}{7} \qquad\qquad \frac{3}{7}$$

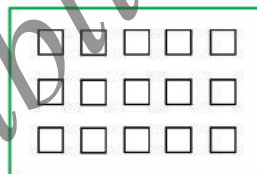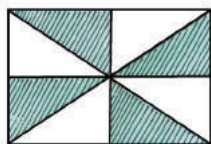Are the shaded parts of each figure equal in size ?

Here $\frac{1}{7}$ is smaller than $\frac{3}{7}$.

Symbolically, we write $\frac{1}{7} < \frac{3}{7}$

Observe that denominator 7 is the same, in both fractions. Numerator 1 is smaller than numerator 3.

Example 2
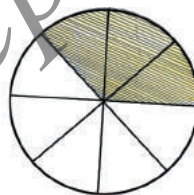
$$\frac{5}{8} \qquad\qquad\qquad \frac{3}{8}$$

Here $\frac{5}{8}$ is greater than $\frac{3}{8}$.

Denominator 8 is same. Numerator 5 is greater than numerator 3.

Symbolically, we write $\frac{5}{8} > \frac{3}{8}$

From these examples, we conclude that if fractions have the same denominator, then

i) smaller the numerator, smaller is the value of the fractional number,

ii) greater the numerator, greater is the value of the fractional number.

Comparison of fractions having same numerators.

Example 1 :

Look at the shaded parts of the following figures.

$$\frac{3}{5}$$

$$\frac{3}{8}$$
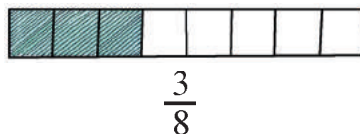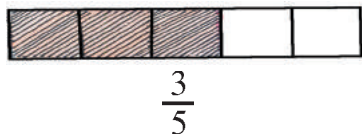
Which shaded part is greater ?

$\frac{3}{5}$ is greater than $\frac{3}{8}$

Example 2

Which shaded part is greater ?

$$\frac{2}{6}$$

$$\frac{2}{4}$$
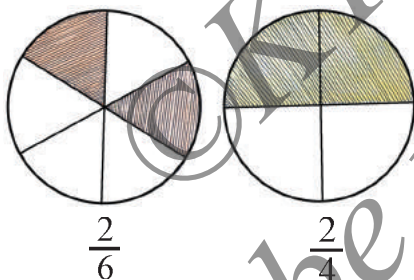
$\frac{2}{4}$ is greater than $\frac{2}{6}$

Symbolically we write $\frac{2}{4} > \frac{2}{6}$

In both these cases, the numerator is same. We observe that, a fraction having lesser denominator is greater.

We can conclude that, if fractions have the same numerator, then

i) greater the denominator, smaller the value of the fractional number,

ii) smaller the denominator, greater the value of the fractional number.

Example :

1) $\frac{4}{13}$ is lesser than $\frac{4}{9}$

$$\frac{4}{13} < \frac{4}{9}$$

2) $\frac{5}{7}$ is greater than $\frac{5}{9}$

$$\frac{5}{7} > \frac{5}{9}$$

Exercise 5.2

Fill in the gaps using > or < signs.

1. $\dfrac{3}{5}$ ☐ $\dfrac{3}{7}$

2. $\dfrac{9}{15}$ ☐ $\dfrac{9}{11}$

3. $\dfrac{4}{7}$ ☐ $\dfrac{4}{5}$

4. $\dfrac{5}{12}$ ☐ $\dfrac{7}{12}$

5. $\dfrac{6}{17}$ ☐ $\dfrac{3}{17}$

6. $\dfrac{5}{19}$ ☐ $\dfrac{11}{19}$

7. $\dfrac{12}{21}$ ☐ $\dfrac{12}{15}$

8. $\dfrac{11}{17}$ ☐ $\dfrac{11}{15}$

9. $\dfrac{6}{11}$ ☐ $\dfrac{6}{15}$

10. $\dfrac{14}{23}$ ☐ $\dfrac{5}{23}$

11. $\dfrac{17}{20}$ ☐ $\dfrac{12}{20}$

12. $\dfrac{11}{15}$ ☐ $\dfrac{8}{15}$

EQUIVALENT FRACTIONS

Example 1 :

Look at these cakes.

The shaded part of all the figures are equal in size.

We notice that in each case half of the figure is shaded.

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

These fractions are called **"Equivalent fractions."**

> **Fractions which indicate the same value are said to be equivalent fractions.**

Example 2 : Observe the following figures.
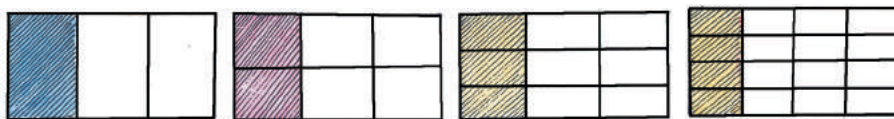
$$\therefore \frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12}$$

$$\frac{1}{3} = \frac{1}{3} \times \frac{2}{2} = \frac{1 \times 2}{3 \times 2} = \frac{2}{6}; \quad \frac{1}{3} = \frac{1}{3} \times \frac{3}{3} = \frac{1 \times 3}{3 \times 3} = \frac{3}{9};$$

$$\frac{1}{3} = \frac{1}{3} \times \frac{4}{4} = \frac{1 \times 4}{3 \times 4} = \frac{4}{12} \quad \text{and so on}\ldots\ldots\ldots\ldots$$

Thus, **to find equivalent fractions, multiply the numerator and the denominator of the fraction by the same number (other than zero).**

Example 3 : Write two equivalent fractions of $\frac{3}{7}$.

$$\frac{3}{7} = \frac{3}{7} \times \frac{2}{2} = \frac{3 \times 2}{7 \times 2} = \frac{6}{14}; \quad \frac{3}{7} = \frac{3}{7} \times \frac{3}{3} = \frac{3 \times 3}{7 \times 3} = \frac{9}{21}$$

$$\therefore \frac{3}{7} = \frac{6}{14} = \frac{9}{21}$$

Checking the equivalence of fractions.

Example 4 : a) $\frac{3}{4}$ and $\frac{9}{12}$ b) $\frac{2}{7}$ and $\frac{6}{18}$

$\frac{3}{4} \bowtie \frac{9}{12}$ (cross multiply) $\frac{2}{7} \bowtie \frac{6}{18}$ (cross multiply)

$3 \times 12 = 36$ $2 \times 18 = 36$

$4 \times 9 = 36$ $7 \times 6 = 42$

$36 = 36$ $36 \neq 42$

$\therefore \frac{3}{4} = \frac{9}{12}$ $\frac{2}{7} \neq \frac{6}{18}$

$\frac{3}{4}$ is equivalent to $\frac{9}{12}$ $\frac{2}{7}$ is not equivalent to $\frac{6}{18}$

We conclude that in given two fractions,

i) if the two fractions are cross multiplied and the products are equal, then the fractions are equivalent.

ii) if the two fractions are cross multiplied and the products are not equal, then the fractions are not equivalent.

Finding equivalent fraction with given numerator and denominator.

Example 5 :   a) $\dfrac{2}{5} = \dfrac{\boxed{}}{15}$

$$\dfrac{2}{5} = \dfrac{2 \times \boxed{3}}{5 \times 3} = \dfrac{\boxed{6}}{15}$$

b) $\dfrac{3}{7} = \dfrac{12}{\boxed{}}$

$$\dfrac{3}{7} = \dfrac{3 \times 4}{7 \times \boxed{4}} = \dfrac{12}{\boxed{28}}$$

Exercise 5.3

I   Complete the series.

1) $\dfrac{2}{3} = \dfrac{4}{6} = \dfrac{\boxed{}}{9} = \dfrac{8}{\boxed{}}$

2) $\dfrac{5}{7} = \dfrac{\boxed{}}{14} = \dfrac{15}{\boxed{}} = \dfrac{\boxed{}}{42}$

II Write the next three equivalent fractions.

1) $\dfrac{2}{5},\ \dfrac{4}{10},$ ...., ..., ...

2) $\dfrac{3}{8},\ \dfrac{6}{16},$ ...., ..., ...

3) $\dfrac{9}{11},\ \dfrac{18}{22}\ ,$ ...., ..., ...

III. Are the two fractions equivalent ? Mark with ✓ or ✗

1) $\dfrac{3}{5}$ and $\dfrac{18}{30}$

2) $\dfrac{12}{17}$ and $\dfrac{8}{20}$

3) $\dfrac{2}{7}$ and $\dfrac{7}{21}$

4) $\dfrac{5}{11}$ and $\dfrac{25}{55}$

IV. Find an equivalent fraction of $\dfrac{4}{7}$ having

1) 16 as numerator

2) 24 as numerator

3) 21 as denominator

4) 84 as denominator

Simplification of fractions

Example 1

Look at the equivalent fractions.

$$\dfrac{1}{2}=\dfrac{2}{4}=\dfrac{4}{8} \ ; \ \dfrac{1}{2}=\dfrac{1\times2}{2\times2}=\dfrac{2}{4} \ ; \ \dfrac{1}{2}=\dfrac{1\times4}{2\times4}=\dfrac{4}{8}$$

$\therefore$ We can write these as $\dfrac{4}{8}=\dfrac{2}{4}=\dfrac{1}{2}$

How can we get $\dfrac{2}{4}$ and $\dfrac{1}{2}$ as the equivalent fractions of $\dfrac{4}{8}$?

$$\frac{4}{8} = \frac{4}{8} \div \frac{2}{2} = \frac{4 \div 2}{8 \div 2} = \frac{2}{4}$$

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

From the above examples, we can conclude that, equivalent fractions are obtained by dividing the numerator and the denominator of the given fraction by the same number (except 0).

Example 2 : $\frac{3}{9} = \frac{3}{9} \div \frac{3}{3} = \frac{3 \div 3}{9 \div 3} = \frac{1}{3}$ Thus, $\frac{3}{9} = \frac{1}{3}$

$\frac{8}{16} = \frac{8}{16} \div \frac{8}{8} = \frac{8 \div 8}{16 \div 8} = \frac{1}{2}$ Thus, $\frac{8}{16} = \frac{1}{2}$

$\frac{8}{16} = \frac{8}{16} \div \frac{4}{4} = \frac{8 \div 4}{16 \div 4} = \frac{2}{4}$ Thus, $\frac{8}{16} = \frac{2}{4}$

$\frac{8}{16} = \frac{8}{16} \div \frac{2}{2} = \frac{8 \div 2}{16 \div 2} = \frac{4}{8}$ Thus, $\frac{8}{16} = \frac{4}{8}$

$\frac{15}{25} = \frac{15}{25} \div \frac{5}{5} = \frac{15 \div 5}{25 \div 5} = \frac{3}{5}$ Thus, $\frac{15}{25} = \frac{3}{5}$

To get a simplified form of a fraction with lower terms, divide the numerator and the denominator of the given fraction by the same number.

In this case the value of the equivalent fractions remain the same as the given fraction.

Example 3

Reduce the fraction $\frac{36}{42}$ to its lowest form.

$$\frac{36}{42} = \frac{36}{42} \div \frac{2}{2} = \frac{36 \div 2}{42 \div 2} = \frac{18}{21}$$

(both the numerator and denominator are divided by same number 2.)

Can you reduce $\dfrac{18}{21}$ further ?

$$\dfrac{18}{21} = \dfrac{18}{21} \div \dfrac{3}{3} = \dfrac{18 \div 3}{21 \div 3} = \dfrac{6}{7}$$ (divide both by the same number 3.)

Can you reduce $\dfrac{6}{7}$ further ?

The only number by which both 6 and 7 can be divided is 1. When you reach this stage, you get the lowest form.

Or

$$\dfrac{36}{42} = \dfrac{36}{42} \div \dfrac{6}{6} = \dfrac{36 \div 6}{42 \div 6} = \dfrac{6}{7}$$

1. Reducing a fraction to its lowest form is called simplification of fraction.

2. To get the simplest form of a given fraction, go on dividing the numerator and the denominator by the same number until you get lowest form.

Exercise 5.5

I. Reduce each of the following fractions into its lowest form.

1) $\dfrac{8}{16}$ 2) $\dfrac{5}{10}$ 3) $\dfrac{54}{108}$ 4) $\dfrac{4}{20}$ 5) $\dfrac{3}{15}$

6) $\dfrac{12}{16}$ 7) $\dfrac{9}{27}$ 8) $\dfrac{36}{48}$ 9) $\dfrac{24}{56}$ 10) $\dfrac{24}{72}$

Chapter - 6

ANGLES

After studying this Chapter you can,

- explain the meaning of an angle with the help of folded paper, sticks, hands of a clock etc.,

- identify the situations and objects where angles are formed in the surrounding environment,

- measure and name the different angles,

- identify right angle, acute angle and obtuse angle in the environment,

- identify and use skilfully the instruments from a geometrical instrument box,

- trace and draw right angle, acute angle and obtuse angle.

## Let us observe some of the daily activities.

- When you stand in a line for marchpast, you will turn to your right or to your left, according to the instructions. While turning can you say how much you have turned ?
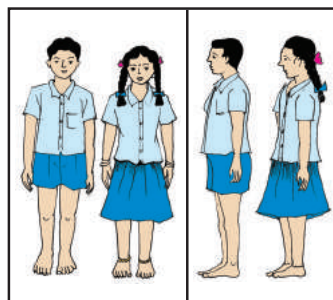
- How much you have to turn the tap to get water ?
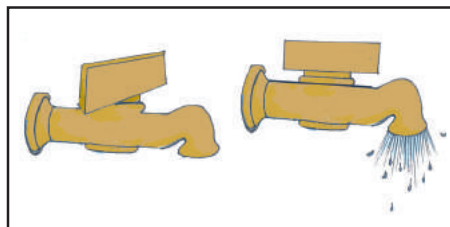
- Have you observed the regulator of a fan? To increase or decrease the speed of a fan, we have to turn the knob of the regulator. In the figure, the knob of the regulator has been turned from **0** to **3**. What is the measure of this rotation?
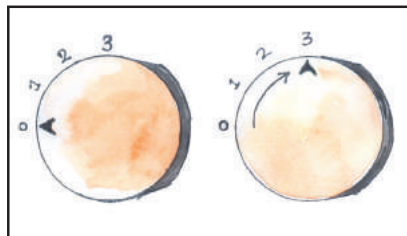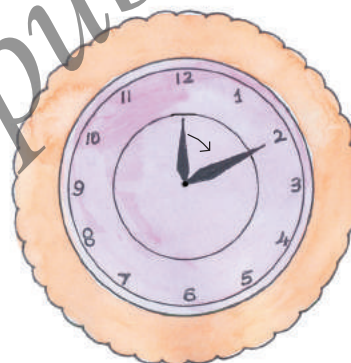

- The bus driver will turn the steering wheel of the bus. How can you measure the rotation of steering wheel ?
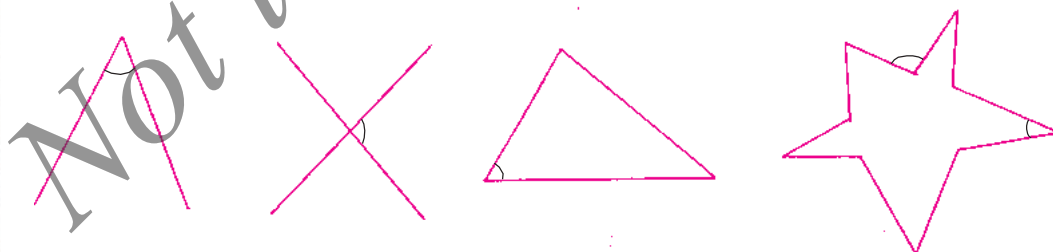

Angles

- The minute hand of a clock will turn in 10 minutes as shown in the figure. Here the rotation of the needle can be represented as an **angle**. This angle has two arms (sides) and one common point.

Observe the following geometrical figures having angles.

In the above figures, some angles are marked by drawing lines. Identify the remaining angles by drawing lines as shown.