

MATHS MAGIC

Class - V

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Foreword

The Government of Andhra Pradesh has unleashed a new era in school education by introducing extensive curricular reforms from the academic year 2020-21. The Government has taken up curricular reforms intending to enhance the learning outcomes of the children with focus on building solid foundational learning and to build up an environment conducive for an effective teaching-learning process. To achieve this objective, special care has been taken in designing the textbooks to achieve global standards.

As a part of the curricular reform, in order to support the designing of textbooks, with better pedagogical strategies, handbooks are given to teachers with elaborate lesson plans. For the practice of the students, workbooks are given which will reinforce the learning in the classroom. Parental handbooks are prepared to impart awareness regarding the teaching-learning process to the parent community. The textbooks are also designed in such a way that the initial two months will focus on the school readiness of the children in order to create a learning environment in the school at the start of the academic year.

In this textbook, concepts are introduced through activities related to daily life incidents, situations, contexts and conversations. To strengthen these concepts, whole class activity, group activity and individual activities are designed. The lessons incorporated are also suitable for multigrade teaching. For additional information on the concepts, QR codes are incorporated in each chapter to enable learning outside the classroom. Care has been taken to ensure that the new textbook is calibrated with the learning requirement of the 21st century.

We are grateful to Honourable Chief Minister Sri. Y.S. Jagan Mohan Reddy for being our source of inspiration to carry out this extensive reform in the education department. We extend our gratitude to Dr. Adimulapu Suresh, Honourable Minister of Education for striving towards qualitative education. Our special thanks to Sri. Budithi Rajsekhar, IAS, Principal secretary, School Education, Sri. Vadrevu Chinaveerabhadru, IAS, Commissioner, School Education, Ms. Vetriselvi.K, IAS, Special Officer for their constant motivation and guidance.

We convey our thanks to the expert team who studied curriculum from Chicago to Singapore and recommended best practices across the globe to reach global standards. Our sincere thanks to SCERT of Kerala, Tamilnadu, Karnataka and Haryana in designing the textbooks. We also thank our textbook writers, editors, artists and layout designers for their contribution in the development of this textbook. We invite constructive feedback from the teachers and parents in the further refinement of the textbook.

Dr. B. Pratap Reddy
Director
SCERT – Andhra Pradesh

Instructions to Teachers

- ☞ The new text books designed for class 1 to 5 are in accordance with the recommendations of NCF – 2005, RTE – 2009, APSCF – 2011 and NEP – 2019 Draft.
- ☞ Use the face sheet placed at the beginning of every lesson as the basis for interacting with the children to encourage, speak and motivate them to listen. Prepare and organize some more activities similar to the activities given in the text book for every concept.
- ☞ The lessons are designed based on the classwise expected learning outcomes and the concepts like number system, measurement, geometry, data handling etc are arranged in a spiral approach.
- ☞ The text book contains three important components under headings like – Do these, Try these and Exercise. The questions under the component ‘Do these’, will be direct and simple and ‘Try these’ are difficult. Similarly the ‘Exercise’ component contains mixed questionnaire of 2 or 3 concepts.
- ☞ The teacher should read and understand every concept in the text book before going for teaching. Also they should conduct the individual, group and whole class activities in the class room. Teacher should use the hand book designed for this purpose.
- ☞ Teacher should prepare and use teaching learning material related to the activities of the text book by using available resources, to make the children understand the concepts.
- ☞ Teacher should provide required practice activities to teach children different concepts keeping in mind the academic standards of the subject.
- ☞ Work book is also provided along with the textbook. The 90 minutes duration of a period should be divided for the practice of the children as follows,
 - ◆ 45 minutes for practising the concepts of text book.
 - ◆ 45 minutes for practising the sums of work book.
- ☞ New text book is designed with exercises and activities. So, in such a way that the pupil will be able to understand the concept of Number system, Fractions, Geometry, Multiples and factors, Measurements and Time. The first chapter, Let’s Recall and practice the previous classes concepts. Hence special care should be taken, while teaching this chapter. In this process locally available objects like pebbles, seeds, sticks, beads etc must be used.

Our National Anthem

- Rabindranath Tagore

Jana-gana-mana-adhinayaka jaya he

Bharata-bhagya-vidhata

Panjaba-Sindhu-Gujarata-Maratha

Dravida-Utkala-Banga

Vindhya-Himachala-Yamuna-Ganga

uchchala-jaladhi-taranga

*Tava Subha name jage, tave subha asisa mage,
gahe tava jaya-gatha.*

Jana-gana-mangala-dayaka jaya he

Bharata-bhagya-vidhata.

*Jaya he, Jaya he, Jaya he,
jaya jaya jaya jaya he.*

Pledge

- Pydimarri Venkata Subba Rao

India is my country. All Indians are my brothers and sisters.

I love my country and I am proud of its rich and varied heritage.

I shall always strive to be worthy of it.

I shall give my parents, teachers and all elders respect,
and treat everyone with courtesy. I shall be kind to animals.

To my country and my people, I pledge my devotion.

In their well-being and prosperity alone lies my happiness.

Maths Magic

Class - V

S. No.	Unit	Month	Page No
1.	Let's Recall	June, July	1 - 12
2.	My Number World	August	13 - 29
3.	Additions and Substractions	August, September	30 - 44
4.	Multiplication and Divisions	September	45 - 60
5.	Multiples and Factors	October, November	61- 85
6.	Geometry	November	86 - 116
7.	Data Handling	December	117 - 124
8.	Fractions	December, January	125 - 146
9.	Measurements	February	147 - 166
10.	Time	February	167 - 174
	Revision	March	
	Revision	April	



Teacher Corner



Student Corner

Academic Standards-Learning Outcomes

Academic standards are clear statements about what students must know and be able to do. The following are the specifications on the basis of which we lay down academic standards

Problem Solving

- Using concepts and procedures to solve mathematical problems

Stages of problem solving

- Reads problems
- Identifies all pieces of information
- Separates relevant pieces of information
- Understanding what concept is involved
- Selection of procedure
- Solving the problem

Reasoning and Proof

- Reasoning between various steps
- Understanding and making mathematical generalizations and conjectures
- Understanding and justifying procedures
- Examining logical arguments
- Understanding the notion of proof
- Using inductive and deductive logic
- Testing mathematical conjectures

Communication

- Writing and reading mathematical expressions
- Creating mathematical expressions
- Explaining mathematical ideas in his/her own words
- Explaining mathematical procedure
- Explaining mathematical logic

Connections

- Connecting concepts within a mathematical domain
- Making connections with daily life
- Connecting mathematics to different subjects
- Connecting concepts of different mathematical domains
- Connecting concepts to multiple procedures

Visualization and representation

- Interprets and reads data in tables, number line, pictograph, bar graph, 2D figures, 3D figures, pictures
- Making tables, number line, pictograph, bar graph, pictures



Sai is studying 5th class and his sister Valli is studying 3rd class. In summer holidays, Sai and Valli wanted to go to Bangalore with their grand-father Nagayya. They reached Vijayawada railway-station.



Observe the picture and answer the following questions:

1. What is the platform number?
2. How many persons are sitting on the bench?
3. What is the time shows in the clock?
4. How many blades are there to the ceiling fan?
5. How many children are there in the picture?
6. How many persons can you see in the picture?

When they entered into the platform number 1, they heard an announcement that the expected time of the arriving train is 30 minutes late. So Sai, Valli and Nagayya went to the waiting hall. Meanwhile, they are observing the train number and platform number displayed on the information board.



Expanded form of Numbers:

Nagayya: How many trains are there on the display-board? What is the number of Hatiya Super Fast Express?

Sai: There are 4 trains on display-board. Hatiya Superfast Express number is one two eight three six (12836).

Nagayya: Read this number with place-values.

Sai read the number in this way.

Ten Thousand	Thousand	Hundred	Tens	Ones
1	2	8	3	6

$$\begin{aligned}
 \text{Expansion of } 12836 &= (1 \times 10,000) + (2 \times 1,000) + (8 \times 100) + (3 \times 10) + (6 \times 1) \\
 &= 10,000 + 2,000 + 800 + 30 + 6 \\
 &= 12,000 + 800 + 30 + 6 \\
 &= 12 \text{ thousand} + 8 \text{ hundred} + 3 \text{ tens} + 6 \text{ ones}
 \end{aligned}$$

So, we read 12,836 as **Twelve thousand, eight hundred and thirty six.**

Exercise - 1

1) Write the following numbers in words.

- a) 9 b) 37 c) 267 d) 607 e) 5298 f) 1307 g) 42689 h) 52006

2) Write the expanded form for the following numbers.

- a) 62 b) 39 c) 792 d) 308 e) 3472 f) 9210 g) 61287 h) 20508

3) Write the place values of the underlined digits in the following numbers.

- a) 48 b) 63 c) 834 d) 607 e) 2519 f) 6920 g) 12453 h) 52146

4) Find the sum of the place values of 6 in the following numbers.

- a) 266 b) 616 c) 665 d) 6236 e) 64,624 f) 67,426 g) 86,216.

5) Write the predecessor and successor for the following numbers.

- a) 9 b) 99 c) 539 d) 621 e) 4001 f) 3210 g) 10000

6) Fill the following table.

@	1-digit number	2-digit number	3-digit number	4-digit number	5-digit number
Smallest number					
Greatest number					

7) Write the suitable numbers for the following.

- a) $10 + 2 =$ _____ d) $10000 + 3000 + 500 + 50 + 6 =$ _____
 b) $200 + 30 + 5 =$ _____ e) $50000 + 2000 + 800 + 50 + 7 =$ _____
 c) $4000 + 500 + 70 + 4 =$ _____ f) $30,000 + 500 + 8 =$ _____

8) Write the greatest 4-digit number by using 7,6,5 and 2 = -----.

9) Write the smallest 4-digit number by using 2,0,8 and 7 = -----.

10) How many 100s are there in 1,000?

Let's observe the transactions in a pass book:

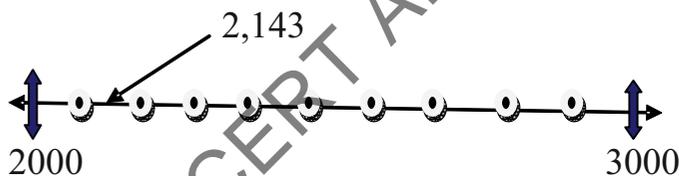
Nagayya took his bank-pass book from his handbag to see his bank transactions. Sai was very curious to see the bank-pass book. Grand-father gave his pass-book to Sai. He explained all the entries in the Pass Book.

Name: Nagayya PASS-BOOK				
Date	Details	Debit	Credit	Balance
30-04-2019	Available balance			143
02-05-2019	Credit pension		9,700	9,843
03-05-2019	Balaji grocery	5,200		4,643
10-05-2019	House-rent	2,500		2,143
20-05-2019	LIC-policy	1,500		643
31-05-2019	Bank ATM charges	50		593

Now answer the following questions:

- 1) When did Nagayya have the highest balance amount? How much?
- 2) When did he have the lowest balance amount? How much?
- 3) Compare 9,843 and 143 with suitable symbols ($>$ or $<$ or $=$)
- 4) Write the amounts in the balance column in ascending order.
- 5) Write the amounts in the balance column in descending order.

Ex: Then, Nagayya explained, How to round-off given numbers to nearest thousand.



So rounding off 2,143 to the nearest thousand = 2,000

Exercise - 2

- 1) Round off the following numbers to the nearest tens.
a) 32 b) 78 c) 123 d) 485 e) 2546 f) 5814 g) 25796
- 2) Round off the following numbers to the nearest hundreds.
a) 312 b) 956 c) 123 d) 485 e) 2546 f) 5814 g) 796
- 3) Round off the following numbers to the nearest thousands.
a) 5264 b) 7532 c) 1234 d) 4850 e) 25463 f) 5014 g) 95150

4) Use symbols (<, > or =) between the numbers.

a) 9 5

b) 21 39

c) 405 504

d) 1565 1565

e) 12578 25178

f) 90507 70503

g) 42179 42179

h) 81456 65899

5) Write these numbers in ascending order:

a) 2,1,5,9,7

b) 27,46,10,29,72

c) 402,204,315,351,610

d) 3725, 7536, 7455, 7399, 2361

e) 25478, 25914, 25104, 25072

f) 46202, 10502, 60521, 81134

6) Write these numbers in descending order:

a) 3,8,4,2,1

b) 97,69,96,79,90

c) 205,402,416,318,610

d) 8016, 916, 10219, 41205, 2430

e) 57832, 57823, 57830, 57820, 57825

f) 16342, 86620, 46241, 64721, 46820

Nagayya tried to explain about the credits and debits in the pass book to Sai.

Example-1: Available balance as on 30-04-19	=	₹ 143
Credited pension on 02-05-2019	=	(+) ₹ 9,700
The balance as on 02-05-2019	=	<u>₹ 9,843</u>

∴ 143 + 9,700 = 9,843

Example-2: Balance as on 02-05-2019	=	₹ 9,843
Debit at Balaji-grocery	=	₹ 5,200
The balance as on 03-05-2019	=	<u>₹ 4,643</u>

∴ 9843 - 5200 = 4643

Let's check other debits and balance columns.

4 6 4 3
(-) 2 5 0 0

2 1 4 3
(-) 1 5 0 0

6 4 3
(-) 5 0

Exercise - 3

1) Do the following.

- a) $4 + 6$ b) $9 + 5$ c) $58 + 69$ d) $45 + 27$
e) $143 + 235$ f) $539 + 709$ g) $2,658 + 5,131$ h) $2,056 + 8,997$

2) Do the following. Check your answer.

- a) $8 - 5$ b) $72 - 36$ c) $82 - 37$ d) $798 - 527$
e) $850 - 456$ f) $6527 - 2314$ g) $4526 - 2398$ h) $4005 - 2589$

3) To get 5629, how much should we add to 1058?

4) To get 1250, how much should we subtract from 9658?

5) Mounika has ₹ 5270. Radhika has ₹ 550 more than Mounika. Then find the total money with Mounika and Radhika.

6) Kohli made 120 runs in a match. Rohit made 65 runs less than Kohli in the same match. Find the total runs made by Kohli and Rohit.

The train arrived and the three got into the train. A person from pantry car approached and took order for 3 meals at the rate of ₹ 95 each.



Total amount paid to meal:

The cost of 1 meal is ₹ 95. How much will Nagayya have to pay for 3 meals?

$$\begin{array}{r} 95 \times 3 \\ \hline 285 \end{array} \quad \boxed{15}$$

Hence, Nagayya paid ₹ 285 towards 3 meals.

Example: Total seats in this compartment are 72. If this train has 12 compartments, how many seats are there in the train?

$$\begin{array}{r} 72 \times 12 \\ \hline 144 \text{ } (72 \times 2) \\ + 720 \text{ } (72 \times 10) \\ \hline 864 \end{array}$$

∴ The total seats in the train are 864.

Cost of each ticket:

Meanwhile, T.C came and asked to show their ticket. The grand-father showed the ticket to T.C. Then Sai and Valli are asked to watch the information given on the ticket.

HAPPY JOURNEY <i>Vijayawada to Bangalore</i>						
PNR No	Train No	Date	Km	Adult	Child	Ticket No
442-8324463	18463	31-05-2019	669	1	2	24486031
COACH	SEAT/BERTH	GENDER	AGE	R.FEE	T.CASH	
S10	9(LB)	Male	60			
S10	10(MB)	Male	10	150	1950	
S10	11(UB)	Female	8			

Nagayya: Total amount for 3 tickets is ₹1950 (This includes reservation charge ₹ 150).

What is the cost of 3 tickets without reservation charge?

Sai:

Total amount	= ₹ 1950
Res. Charge	(-) = ₹ 150
Amount towards only tickets	= ₹ 1800

Nagayya: How much amount is paid by each towards reservation and ticket?

$$\text{Total reservation fee} = ₹ 150$$

$$\text{Total tickets amount} = ₹ 1800$$

$$\begin{aligned} \text{Res.charge for each} &= ₹ 150 \div 3 \\ &= ₹ 50 \end{aligned}$$

$$\begin{aligned} \text{Ticket charge for each} &= ₹ 1800 \div 3 \\ &= ₹ 600 \end{aligned}$$

$$\begin{array}{r} 3 \overline{) 150} \\ \underline{- 15} \\ 00 \\ \underline{- 00} \\ 00 \end{array}$$

$$\begin{array}{r} 3 \overline{) 1800} \\ \underline{- 18} \\ 00 \\ \underline{- 00} \\ 00 \\ \underline{- 00} \\ 0 \end{array}$$

Exercise - 4

1) Do the following.

a) 8×2 b) 24×8 c) 68×56 d) 386×7 e) 951×15 f) 253×14 g) 9685×20

2) Do the following.

a) $6 \div 2$ b) $68 \div 7$ c) $85 \div 3$ d) $508 \div 4$ e) $599 \div 13$ f) $786 \div 16$ g) $9501 \div 30$

3) In an apple box, there are 8 crates and in each crate there are 15 apples. How many apples are there in the box?

4) Product of two numbers is 560. One of the numbers is 10. Find the other number.

5) If ₹ 45000 are distributed equally among 20 old age pensioners, then how much amount will each get?

6) The cost of 1 dozen books is ₹ 840. What is the cost of 1 book? (1 Dozen=12)

7) Complete the table.

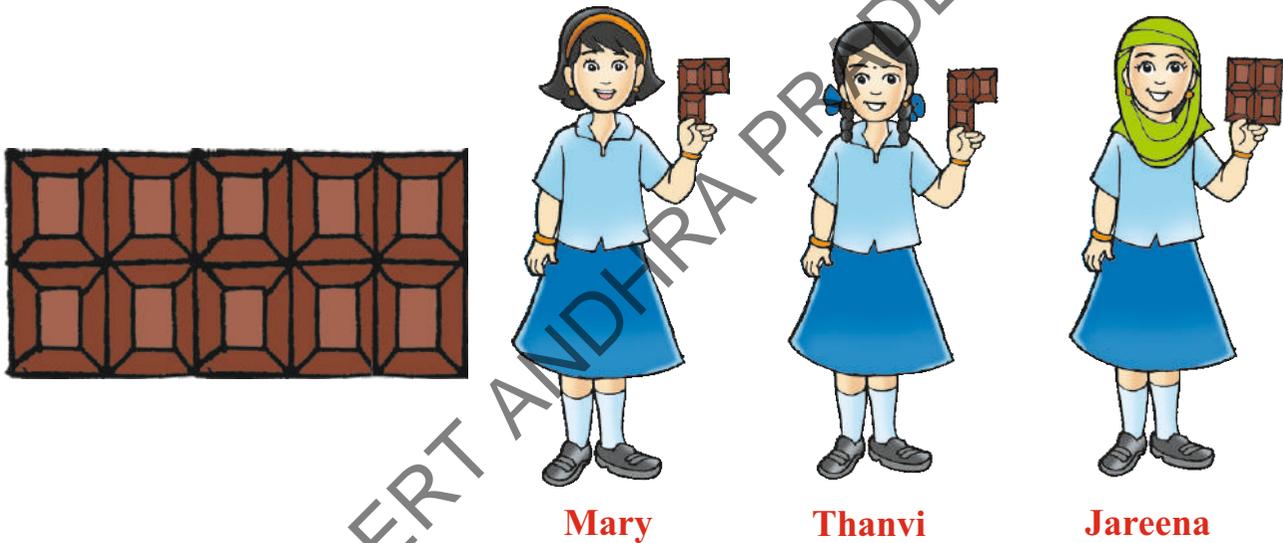
Item	Price (per kg) in ₹	Quantity	Total cost in ₹
Sugar	42	12 kg	$42 \times 12 = 504$
Ground nut	135	15kg	
Red gram	90	8kg	
Green gram	75	9kg	

8) Complete the table.

Item	Quantity	Total cost in ₹	Cost per kg in ₹
Jaggery	3kg	135	$135 \div 3 = 45$
Ghee	2kg	950	
Apples	10kg	960	
Red gram	5kg	450	

Addition and subtraction of like fractions:

Jareena, Mary and Thanvi are friends. Jareena has big chocolate. She distributed the chocolate in the following way.



- Number of equal pieces in the big chocolate = 10
- Number of chocolate pieces Mary got = 3
- Number of chocolate pieces Thanvi got = 3
- Number of chocolate pieces Jareena got = 4
- Fraction part taken by Mary = $\frac{3}{10}$
- Fraction part taken by Thanvi = $\frac{3}{10}$
- Fraction part taken by Jareena = $\frac{4}{10}$

We know that!
 If $\frac{a}{b}$ is fraction, then
 a is called
 'numerator' and b is
 called 'denominator'.

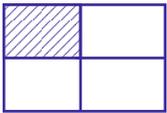
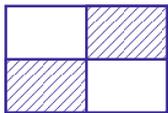
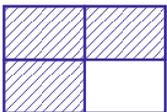


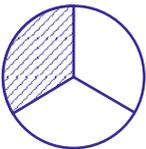
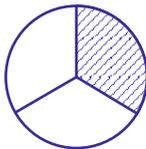
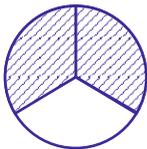
We know that fractions with same denominators are called “like fractions”

$\frac{3}{10}$ and $\frac{4}{10}$ are like fractions

Can you give 3 more like fractions with denominator 10?

Addition of like fractions:-

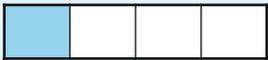
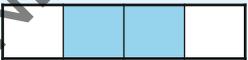
a)  +  = 
 $\frac{1}{4}$ + $\frac{2}{4}$ =

b)  +  = 
 $\frac{1}{3}$ + $\frac{1}{3}$ =

Example: $\frac{1}{10} + \frac{3}{10} = \frac{1+3}{10} = \frac{4}{10}$

Do these

1. Shade and write the fraction in boxes given below.

a)  +  = 
 + =

b)  +  = 
 + =

2. Find the sums.

a) $\frac{6}{9} + \frac{2}{9} =$

d) $\frac{4}{7} + \frac{3}{7} =$

g) $\frac{25}{49} + \frac{13}{49} =$

b) $\frac{2}{11} + \frac{7}{11} =$

e) $\frac{8}{15} + \frac{2}{15} =$

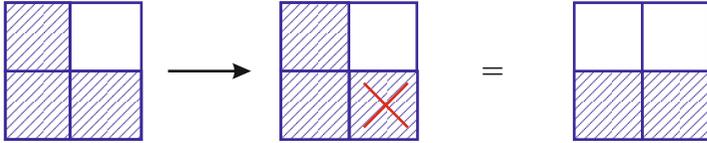
h) $\frac{25}{81} + \frac{53}{81} =$

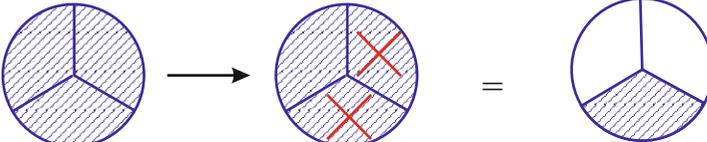
c) $\frac{3}{7} + \frac{2}{7} =$

f) $\frac{9}{22} + \frac{8}{22} =$

i) $\frac{42}{97} + \frac{21}{97} =$

Subtraction of like fractions:-

a) 
 $\frac{3}{4} \longrightarrow \frac{3}{4} - \frac{1}{4} = \frac{\quad}{\quad}$

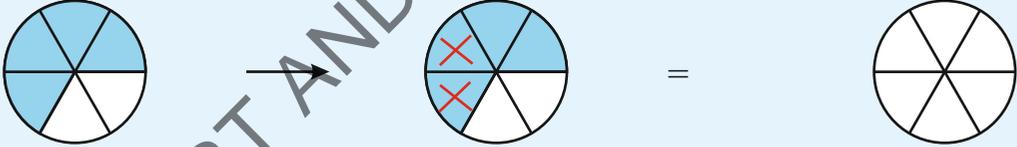
b) 
 $\frac{3}{3} \longrightarrow \frac{3}{3} - \frac{2}{3} = \frac{\quad}{\quad}$

Example : $\frac{8}{10} - \frac{7}{10} = \frac{8-7}{10} = \frac{1}{10}$

Do these

1. Shade and write the fraction in boxes given below.

a) 
 $\frac{\quad}{\quad} \longrightarrow \frac{\quad}{\quad} = \frac{\quad}{\quad}$

b) 
 $\frac{\quad}{\quad} \longrightarrow \frac{\quad}{\quad} = \frac{\quad}{\quad}$

2. Find the difference.

a) $\frac{9}{11} - \frac{2}{11} =$ c) $\frac{8}{9} - \frac{4}{9} =$ e) $\frac{11}{16} - \frac{3}{16} =$ g) $\frac{13}{30} - \frac{10}{30} =$
 b) $\frac{5}{11} - \frac{3}{11} =$ d) $\frac{7}{10} - \frac{2}{10} =$ f) $\frac{9}{20} - \frac{5}{20} =$ h) $\frac{21}{40} - \frac{11}{40} =$

Exercise - 5

1) Do the following.

a) $4578 + 121$ b) $897 + 9547$ c) $9897 + 6027$ d) $5240 + 253 + 32 + 5$

2) Giri received ₹ 2250 towards old age pension and ₹ 9500 under Rythubharosa scheme.

How much amount did he get?

- 3) In a village, the number of females is 250 more than that of males. If the number of males is 1590, find the population in the village.
- 4) Do the following:
 a) $3128 - 298$ b) $4021 - 2837$ c) $6000 - 1234$ d) $2001 - 256 - 1258$
- 5) Sum of two numbers is 7680. One of the two numbers is 2519. Find the other number.
- 6) Seetha has ₹ 6500. Raju has ₹ 155 less than Seetha's amount. Find the amount with Raju.
- 7) Do the following.
 a) 342×12 b) 674×35 c) 704×67 d) 456×25 e) 508×68
- 8) Vijaya has ₹ 685 Karthik has 13 times more than Vijaya's amount. Find the amount with Karthik.
- 9) The cost of a fan is ₹ 685 and a table is ₹ 2250. Find the total cost of 2 fans and 3 tables.
- 10) The cost of a paint bucket was ₹ 750. Lalitha wanted to paint her house, so she bought 5 buckets. How much amount did she pay for 5 buckets of paint?
- 11) A pair of shoes costs ₹ 250. A donar wants to donate shoes for 32 children in a school. Find how much amount will he require to buy shoes?
- 12) There are 105 words on each page of a book on an average. If the book contains 53 pages, find how many words are there in the book?
- 13) Do the following.
 a) $385 \div 5$ b) $406 \div 6$ c) $790 \div 12$ d) $500 \div 25$ e) $786 \div 50$ f) $901 \div 43$
- 14) Product of two numbers is 980. One of them is 5. Find the other number.
- 15) If 125 chocolates were distributed equally among 25 members, find how many chocolates will each get?
- 16) Do the following.
 a) $\frac{3}{10} + \frac{4}{10}$ b) $\frac{4}{8} + \frac{3}{8}$ c) $\frac{7}{8} - \frac{2}{8}$ d) $\frac{4}{9} - \frac{1}{9}$
- 17) Ravi read $\frac{1}{4}$ th of the pages in a book. How much part is yet to be completed in the book?
- 18) Bhinneswar distributed $\frac{2}{7}$ of his property to his daughter, and $\frac{3}{7}$ to his son. How much part of his property was distribute to his children?



Chapter 2

My Number World



Rekha and Harsha are studying 5th class. Their class teacher asked them to collect the information of population of their Village/ward, Mandal and District from their Village/Ward Secretariat. They went to the village secretariat and collected the information.



Collect and write the population of your

Village: _____

Mandal: _____

District: _____

What is the population of Katarupalli village?

What is the population of Gandlapenta mandal?

Can anyone say the population of Anantapuramu district?

It has more than five digits. You have learned up to 5-digit numbers only in your previous class. Now you will learn numbers with 6-digits and more.

Lakh:

Teacher: What is the greatest 5-digit number?

Student: It is *ninety nine thousand nine hundred and ninety nine*.

Teacher: What is one more than 99,999?

Student: It is *hundred thousand*.

Teacher: It is also called as **One lakh**.

In the same way, 2,00,000 is read as two lakhs,



$$\begin{array}{r} 99,999 \\ +1 \\ \hline 100,000 \end{array}$$



One lakh = 1,00,000



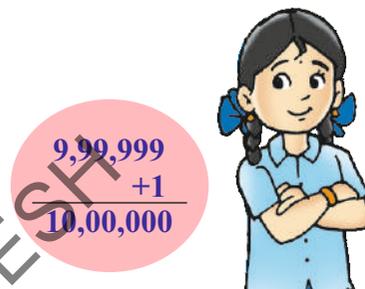
3,00,000 is read as _____ 4,00,000 is read as _____
 5,00,000 is read as _____ 6,00,000 is read as _____
 7,00,000 is read as _____ 8,00,000 is read as _____
 9,00,000 is read as _____ 4,50,000 read as _____

We read 4,53,258 as four lakh, fifty three thousand, two hundred and fifty eight.

7,49,192 is read as _____

Do these

- 1) Read the numbers 3,51,645 and 9,38,715.
- 2) Write any five 6-digit numbers and read.



Ten lakh = 10,00,000, is it?

Ten-lakh: We know that 9,99,999 is the largest six digit number. If we add one more to this one, we will get 10,00,000.

It is the smallest 7-digit number and read as ten lakh.

20,00,000 read as _____ 30,00,000 read as _____
 40,00,000 read as _____ 50,00,000 read as _____
 60,00,000 read as _____ 70,00,000 read as _____

Example: We read the number 75,29,386 as seventy five lakh twenty nine thousand three hundred and eighty six.



Do these

- 1) Read the numbers 65,14,852 and 29,36,429.
- 2) Write any five 7-digit numbers and read.

Activity - 1

Let us draw seven concentric circles on the floor.

Name the circles as 'ones', 'tens', 'hundreds',... from inner most to outer most circles.

Each time a student comes and keeps

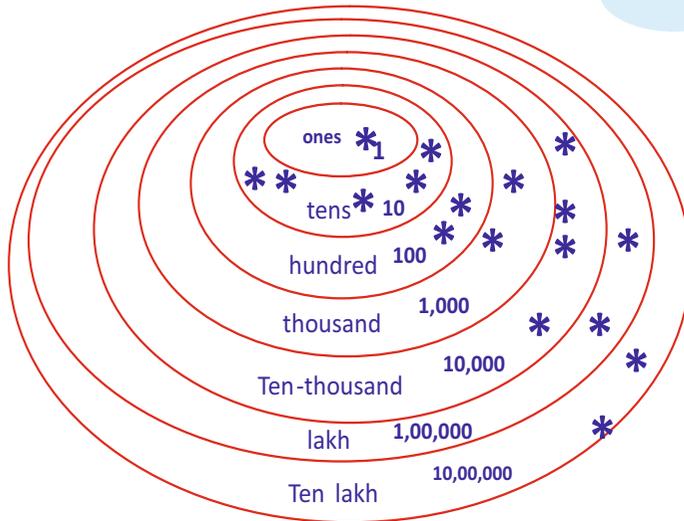
one stone - in 'ones' circle

five stones - in 'tens' circle

two stones - in 'hundreds' circle

Eighth student has to say the number.

Twenty two lakh, forty two thousand, two hundred and fifty one



Exercise - 1

1) Write the following numbers in words.

- a) 1,25,602 b) 4,50,536 c) 80,00,005 d) 5,58,942 e) 95,75,240

2) Write in number for the following.

- a) Five lakh, twenty four thousand, three hundred and ninety six = _____
b) Fourteen lakh, thirty five thousand and fifteen = _____
c) Seventy four lakh, sixty two thousand, four hundred and sixty five = _____

3) Read the following and answer.

Vemanna bought a house for ₹.45,87,000 and a plot beside it, at ₹.18,56,000. He paid a total amount of ₹.64,43,000.

The cost of house (in words): ₹. _____

The cost of the plot (in words): ₹. _____

The total cost of house and plot is (in words): ₹. _____

Crore:



What is the greatest 7 digit number?

It is 99,99,999.



What is one more than this number?

$$\begin{array}{r} 99,99,999 \\ +1 \\ \hline 1,00,00,000 \end{array}$$



It is one Crore. And One crore is the smallest 8 digit number.

Ten crore:

The greatest 8-digit number is _____

What happens when 1 is added to this?

And **Ten crore** is the smallest 9-digit number.

What is the biggest 9-digit number?

In the same way we can have **Hundred Crore, Thousand Crore.....etc.**

Children, ones, tens, hundreds, thousands, ten-thousands, lakhs....etc are the places in **Hindu-Arabic system of numeration** or **Indian system of numeration** which is widely used in our country.

$$\begin{array}{r} 9,99,99,999 \\ +1 \\ \hline 10,00,00,000 \end{array}$$



ten crore = 10,00,00,000

2.2:- Hindu-Arabic system of numeration (Indian system of numeration):-

From the above discussion, we can form a table of places according to Indian system of numeration as follows.....

Place	Ten crore	Crore	Ten lakh	Lakh	Ten thousand	Thousand	Hundred	Ten	One or Unit
	10,00,00,000	1,00,00,000	10,00,000	1,00,000	10,000	1,000	100	10	1
	TC	C	TL	L	TTh	Th	H	T	O or U

Do you know?

- 1) The *Crores*, consist of places not only *Crores place* and *Ten crores place* but also *Hundred crores, thousand crores... etc.*
- 2) We commonly put *comma* firstly after hundreds, next ten-thousands, next ten-lakhs... etc to read any number easily in Indian system.

The following place value chart can help to explain what the number means in Hindu-Arabic system

Place	Ten crore	Crore	Ten lakh	Lakh	Ten thousand	Thousand	Hundred	Ten	One
	10,00,00,000	1,00,00,000	10,00,000	1,00,000	10,000	1,000	100	10	1
Number	1	4	9	5	9	7	8	7	2
Place value of each digit	$1 \times 10,00,00,000$	$4 \times 1,00,00,000$	$9 \times 10,00,000$	$5 \times 1,00,000$	$9 \times 10,000$	$7 \times 1,000$	8×100	7×10	2×1
	10,00,00,000	4,00,00,000	90,00,000	5,00,000	90,000	7,000	800	70	2
Number in words	14,00,00,000		95,00,000		97,000		872		
	Fourteen crore		Ninety five lakh		Ninety seven thousand		Eight hundred and seventy two		

In words:- *Fourteen crore ninety five lakh ninety seven thousand eight hundred and seventy two.*

Standard form (Short form) :- 14,95,97,872

Expanded form:-

$$\begin{aligned} & (1 \times 10,00,00,000) + (4 \times 1,00,00,000) + (9 \times 10,00,000) + (5 \times 1,00,000) + (9 \times 10,000) + \\ & (7 \times 1,000) + (8 \times 100) + (7 \times 10) + (2 \times 1) \\ & = 10,00,00,000 + 4,00,00,000 + 90,00,000 + 5,00,000 + 90,000 + 7,000 + 800 + 70 + 2 \\ & = \text{one ten crore} + \text{four crores} + \text{nine ten lakhs} + \text{five lakhs} + \text{nine ten thousands} + \\ & \text{seven thousands} + \text{eight hundreds} + \text{seven tens} + \text{two} \end{aligned}$$

Do these

1) Write the following numerals in standard form and also write in words.

- a) 721594 b) 4632584 c) 73156324 d) 407523436

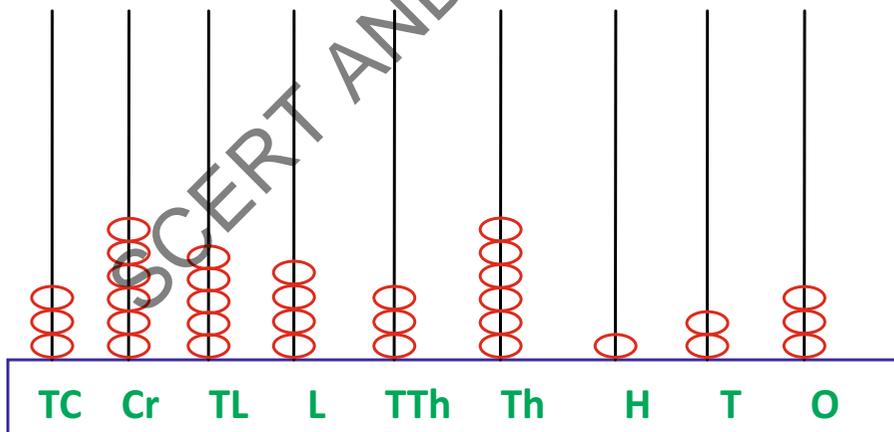
2) Express the following numbers in expanded form.

- a) 7,34,254 b) 42,63,456 c) 40,63,52,456 d) 73,45,46,800

Activity - 2

a) Observe the following representation of a number on spike-abacus.

Example:-

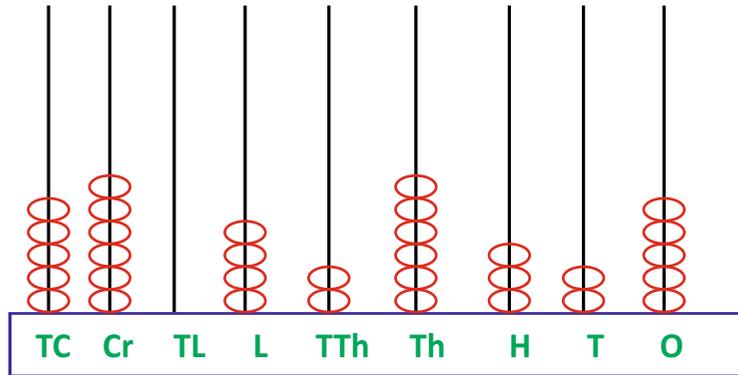


Number in standard form:- 36,54,36,123

Expanded form:- 30,00,00,000 + 6,00,00,000 + 50,00,000 + 4,00,000 + 30,000 + 6,000 + 100 + 20 + 3

Number in words:- Thirty six crore fifty four lakh thirty six thousand one hundred and twenty three.

b) Write the standard form, expanded form and number name for the number represented on spike-abacus.



Number in standard form:- _____

Expanded form:- _____

Number in words:- _____

Do these

1) Draw the spike-abacus for the following numbers in your notebook.

1) 54,56,705

2) 6,27,00,045

3) 72,61,50,305

2) Write the numerals in standard form for the following number names.

a) Twenty five lakh five thousand eight hundred and forty one.

b) Five crore twenty lakh six thousand two hundred and five.

c) Ninety one crore sixty seven lakh thirty five thousand eight hundred and forty two.

3) Write the numerals in standard form for the following expanded forms.

a) $60,00,000 + 0 + 50,000 + 1,000 + 0 + 0 + 8 =$ _____

b) $70,00,00,000 + 30,000 + 5,000 + 400 + 3 =$ _____

c) $20,00,00,000 + 80,00,000 + 40,000 + 500 + 1 =$ _____

Let's Play

Tc	Cr	FL	L	T-Th	Th	H	T	O

Let's draw a table as shown above on the black board. Now come and write the digits in the boxes one after one starting from ones place as you desired with students. As soon as the ninth child writes his digit in ten-crores box, he has to read out the number so formed. Let all should continue the play. This game can also be played with two groups.

Exercise - 2

1) Write the following numerals in standard form using commas in Hindu-Arabic system.

- 1) 24536192 2) 512483427 3) 205030401 4) 900000100

2) Write the following numerals in words.

- 1) 7,29,47,542 2) 93,53,26,491 3) 70,30,10,400 4) 30,00,02,000

3) Write expanded form for the following numerals.

- 1) 3, 49,85,294 2) 72,47,27,144 3) 50,23,80,050 4) 90,07,00,020

4) Write the number in standard for the following.

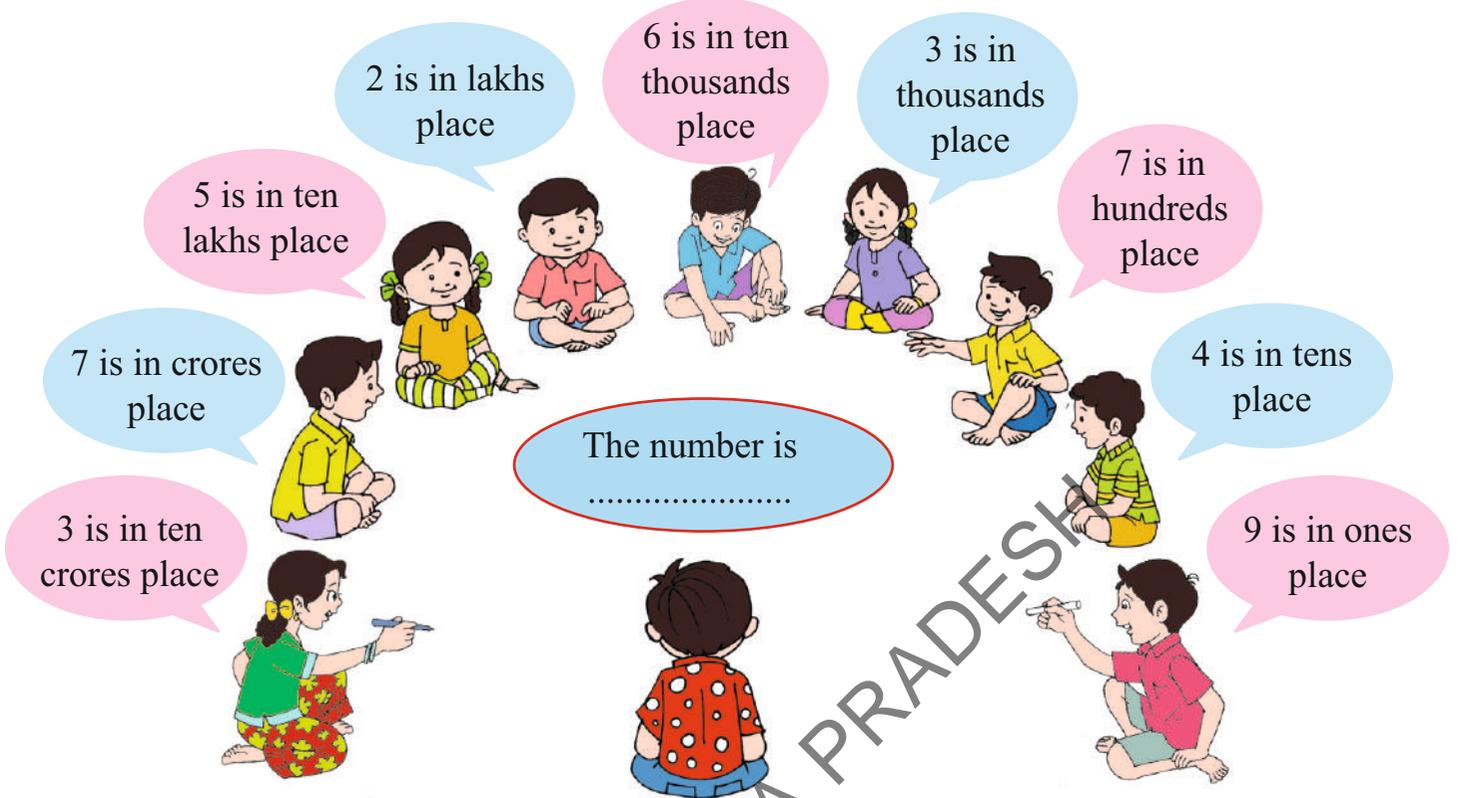
- a) Forty five lakh thirty three thousand six hundred and eighty four.
b) Twenty five core seventy thousand five hundred.
c) 5 crore + 2 ten lakh + 9 lakh + 4 ten thousand + 2 thousand + one hundred + 2 ten + 8 one
d) 9 ten crore + 7 crore + 8 ten lakh + 5 ten thousand + 4 hundred + 1 one.
e) $20,00,00,000 + 4,00,00,000 + 50,00,000 + 3,00,000 + 40,000 + 5,000 + 300 + 70 + 9$
f) $80,00,00,000 + 5,000 + 3$

5) Read the following and answer the questions.

- a) The female population of Uttar Pradesh state is 9,49,85,062 and the male population is 10,45,96,415 according to 2011 census, and the total population is 19,95,81,477.
a) Write number-name of the female population of Uttar Pradesh state.
b) Write expanded form of the male population of the state.
c) Write number-name and expanded forms of the total population of the state.
- b) The distance between Sun to our planet Earth is fourteen crore, ninety five lakh, ninety seven thousand, eight hundred and seventy kilo- meters.

Write the above number-name form as standard form and also write in expanded form.

Fun activity:- Let's do Sankhyavadhanam



2.3:- Place value and Face values of a digit in a number:-

Place of digit:-

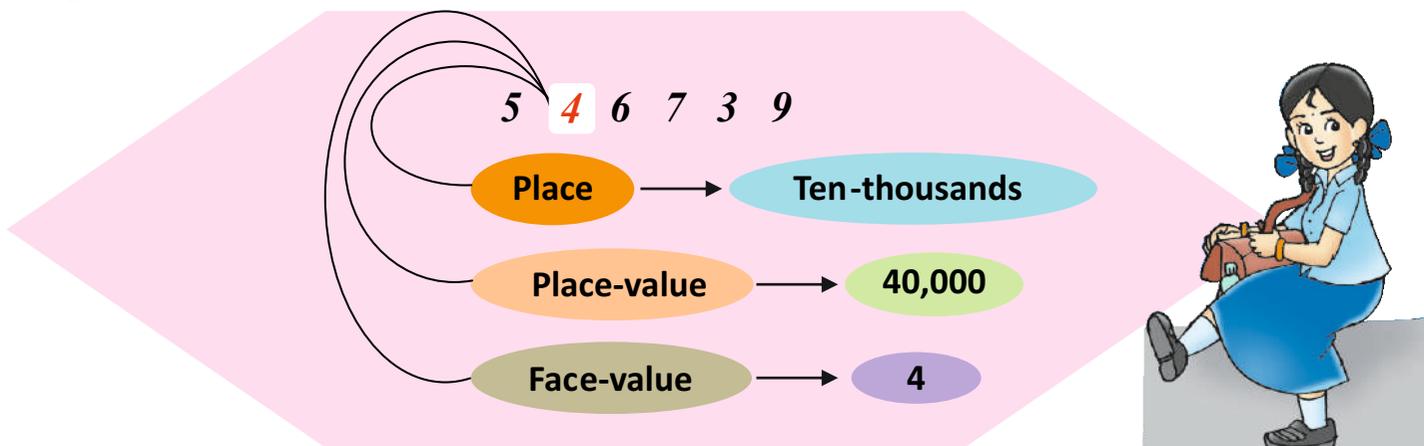
Example:- In 5,46,739, the place of 4 is *ten thousands place*.

Place value of digit:-

Example:- In 5,46,739, the place-value of 4 is $4 \times 10\,000 = 40\,000$, since 4 is in ten thousands place.

Face-value of digit:-

Example:- In 5,46,734, the face-value of 4 is 4.



Do this

Write place, place-value and face-value of the digit underlined in the following numbers.

a) 43, 84,304

b) 43, 67,245

c) 68, 98,23,052

d) 47, 63, 05, 100

Activity - 3

Let's prepare flash-cards having digits from 0 to 9, 10, 20... 90, 100, 200... 900, 1000, 2000,... 9000 like this up to 90,00,00,000 (put commas in appropriate places). Now write a number on board (ex: 43,52,16,978) and form the expanded form of the number using the above flash cards as well as short form could also be formed using the commas. (This activity can be used as group activity or individual activity.)

For example:

Write 43,52,16,978 on blackboard, students will select the cards as shown below and arrange them for expanded form as well as standard form.

40,00,00,000

3,00,00,000

50,00,000

2,00,000

10,000

6,000

900

70

8

2.4:- Formation of numbers from given digits:-

❖ Forming greatest number, using given digits without repeating:-

To form the greatest number, we arrange the given digits in descending order.

Example:- Form the greatest 7-digit number by using the digits 0, 7, 4, 1, 3, 6 and 2.

Sol:- The descending order of digits is 7, 6, 4, 3, 2, 1, 0

Hence the greatest 7-digit number is 76,43,210.

❖ Forming the smallest number from the given digits without repetition:-

Case-1:- When none of the given digits is zero, we arrange the given digits in ascending order to form smallest number.

Example: The smallest 8-digit number formed by using the digits 7, 1, 5, 2, 8, 3, 4 and 9

The ascending order of digits is 1, 2, 3, 4, 5, 6, 7, 8, 9

The smallest number is 1, 23, 45, 789

Case-2:- When one of the given digits is zero in this case we put '0' at the second place from left. We can fill the remaining places from left to right by the remaining digits in ascending order.

- Example:-** a) The smallest seven digit number formed by using the digits 1, 0, 3, 5, 6, 9 and 7 is 1035679.
- b) The smallest 8- digit number formed by using the digits 7, 3, 0, 4, 2, 8, 6 and 9 is 2,03,46,789.

❖ **Forming the smallest or the greatest number using given digits when repeating of digits allowed:-**

To write greatest number, form greatest number using the given digits each only once without repeating. Then in the number so formed, now repeat highest digit in highest places as allowed number of times to form the desired greatest number.

To write smallest number, form smallest number using the given digits each only once without repeating. Then in the number so formed, now repeat the smallest digit in highest places as allowed number of times to form the desired smallest number.

Example:- Write the greatest and smallest 5-digit numbers formed by using all the digits 1, 6 and 9 if repeating allowed.

Sol: The greatest number = 99,961

The smallest number = 11,169

Do these

- 1) Write greatest and smallest 7-digit numbers using the digits 4, 0, 3, 6, 2, 5 and 9 without repeating.
- 2) Write greatest and smallest 6-digit numbers using digits 4, 1, 0 and 3 by allowing any digit, any times repeat but use each digit at least once.



2.5:- Comparing and Ordering:-

Comparing large numbers.

- 1) The number with more number of digits is greater (and the number with less number of digits is smaller.)

For example: 1) $7,35,84,242 > 94,85,096$

2) $52,61,239 < 5,26,12,390$

- 2) If the number of digits is same, compare the digits in the left most place. The number with the greatest left most digit is greater and the number with smallest left most digit is smaller.

For example: 1) $83,45,63,245 > 61,25,61,100$

2) $48,65,41,254 < 68,65,41,254$



My number is 32,54,62,419

My number is 74,00,52,103

Which number is big?



Ordering large numbers:

Let's understand the ordering of large numbers.

Example: Arrange the following numbers in the ascending and the descending orders.

7,36,01,295; 80,34,51,276; 3,04,63,589; 81,72,345; 91,00,32,947

Solution:

Step-1:- Arrange the numbers by place-values.

Step-2:- Using comparison rules, arrange the given numbers in descending order.

Numbers	T-C	C	TL	L	TTh	Th	H	T	o
73601295		7	3	6	0	1	2	9	5
803451276	8	0	3	4	5	1	2	7	6
30463589		3	0	4	6	3	5	8	9
8172345			8	1	7	2	3	4	5
910032947	9	1	0	0	3	2	9	4	7

Hence, the numbers written in the ascending order is

81,72,345 3,04,63,589 7,36,01,295 80,34,51,276 91,00,32,947

The numbers written in the descending order is...

91,00,32,947 80,34,51,276 7,36,01,295 3,04,63,589 81,72,345

Do these

1. Compare the following numbers using the symbols $<$ or $>$ in the blanks.

- 1) 48,34,635 ____ 2,84,00,000
- 2) 9,63,84,312 ____ 9,24,94,989
- 3) 42,35,68,943 ____ 42,35,19,045
- 4) 25,25,25,252 ____ 25,25,25,525



2. Arrange the following numbers in ascending and descending orders.

2345678 607810542 694317 84120079 498900351 902347016

Exercise - 3

1) Workout the following.

a) Write place, place-value and face-value for the underlined digits in the following numbers in Indian system.

- 1) 73,58,942 2) 40,73,35,536 3) 82,45,63 125 4) 64,63,98,524

b) Which digit can be filled in the blank given in the number (47, 5,63,251) whose place-value is 90,00,000?

c) Find five numbers such that the digit in tens place, lakhs place and ten crores place, is 3 and remaining places have the same digit.

d) I am a 9 digit number. My ten crores place digit is two more than the digit in my hundreds place and the digit in my thousands place is 5 more than the digit in my hundreds place. If 3 is in my hundreds place and in remaining places are 1. Express my name in number form.

2) Do the following problems.

1) Form the greatest and the smallest 5-digit numbers using the digits 8, 3, 9, 2 and 5 without repeating.

2) Form the greatest and the smallest 6-digit numbers using the digits 4, 5, 8, 7, 2 and 6 without repeating.

- 3) Form the smallest and the greatest 8-digit numbers using the digits 1, 5, 3, 8, 6, 4, 7 and 2 without repeating.
- 4) Form the greatest and the smallest 7-digit numbers using the digits 5, 0, 8, 4, 3 and 7 (by repeating any one digit but use all digits at least once.)
- 5) Form the greatest and the smallest 6-digit even numbers using 5, 0, 2 and 1 (allowing any digit two times but use each digit at least once.)

3) Compare the following numbers using $>$ or $<$ or $=$ in the blanks.

- 1) 87 83 93 790 _____ 8 29 80 7 58
- 2) 792849758 _____ 46758490
- 3) 90020403 _____ 400953400
- 4) 58694658 _____ 45100857



4) Arrange the following sets of numbers in the ascending order.

- 1) 2828335; 3537286; 1995764; 2989632; 42,86371
- 2) 1643468735; 102947026; 19385702; 148927131; 109125456

5) Arrange the following sets of numbers in the descending order.

- 1) 2003563; 19872003; 279868; 20016930
- 2) 748932165; 482930456; 69539821; 984326834; 289354124

2.6:- International system of numeration (British system of numeration):-

Now let's learn International system or British system of numeration, which is slightly different from Indian system. It is widely used in International communications.

Places of International system of numeration.

Place	Hundred million	Ten million	Million	Hundred thousand	Ten thousand	Thous and	Hund red	Ten	Ones or Units
	HM	TM	M	HTh	TTh	Th	H	T	O or U
	100000000	10000000	1000000	100000	10000	1000	100	10	1

- We notice that up to ten thousands place, both the systems are alike. But there are changes from lakhs place. (Here lakh is taken as **Hundred thousand**, ten lakh is taken as **Million**, crore is taken as **Ten million**, ten crore is taken as **Hundred million** and so on.)
- In the same way, we have **Billions, trillions... etc** followed by **Millions**.
- (We commonly put comma, firstly after hundreds, next hundred-thousands, next hundred-millions, next hundred-billions.... etc to read any number easily in International system.)

For example: Numeral 735632150 is written in the International system as 735, 632, 150 and read as **Seven hundred thirty five million six hundred thirty two thousand one hundred and fifty**. The number expanded as follows...

Place	Hundred million	Ten million	Million	Hundred thousand	Ten thousand	Thousand	Hundred	Ten	One or Unit
Number	7	3	5	6	3	2	1	5	0
Place-value	$7 \times 100\,000\,000$	$3 \times 10\,000\,000$	$5 \times 1\,000\,000$	$6 \times 100\,000$	$3 \times 10\,000$	$2 \times 1\,000$	1×100	5×10	0×1
	700 000 000	30 000 000	5 000 000	600 000	30 000	2 000	100	50	0
Number in words	Seven hundred and thirty five million			Six hundred thirty two thousand			One hundred and fifty		

Example: Write standard form and number name for 720563042 in International system.

Sol: **720, 563, 042**

Number in words: *Seven hundred twenty million five hundred sixty three thousand and forty two.*

Project work:

Collect the news papers of last week and pick out any ten large numbers. Then write their standard forms, number in words and expanded forms for them in both the systems of numeral.



Do these

- 1) Write the following numerals in standard forms in International system and write the number names.
a) 4753625 b) 700400300 c) 4250431 d) 147235857
- 2) Write the following numerals in the International system.
 - a. Three hundred thousands = _____
 - b. 5 millions = _____
 - c. Seventy millions = _____
 - d. Four hundred millions = _____

Comparison of the Indian system and the International systems

Activity - 4

The cost of this house is 1 million and 5 hundred thousand rupees.

The cost of this house is 15 lakh rupees.



House for sale ₹ 150000



Think and say:

From the above discussion, **one million is _____ lakhs.**

Indian system of numeration (Hindu-Arabic system of numeration)			International system of numeration (British system of numeration)		
	Places			Places	
	One or Unit	1		One or Unit	1
	Ten	10		Ten	10
	Hundred	100		Hundred	100
Thousands	Thousand	1000	Thousand	Thousand	1000
	Ten thousand	10 000		Ten thousand	10 000
Lakhs	Lakh	1 00 000	s	Hundred thousand	100 000
	Ten lakh	10 00 000		Million	1 000 000
Crores	Crore	1 00 00 000	Millions	Ten million	10 000 000
	Ten crore	10 00 00 000		Hundred million	100 000 000

Do you Know?

The largest number commonly known as one Googol-flex. It is 10 raised to the power of Googol. (Googol is 1 followed by 100 zeros)

Exercise - 4

- 1) Write the following numerals in standard forms by putting commas, according to International system of numeration.

1) 4528973 2) 53547652 3) 901247381 4) 200200200

Write the number names for the following numbers in British system.

1) 700,000 2) 1,200,000 3) 2,524,000 4) 7,521,256 5) 475,562,125

- 2) Answer the following questions.

- 1 lakh = _____ thousands.
- 1 million = _____ lakhs.
- 1 crore = _____ millions.
- 1 hundred million = _____ crores.
- 1 million = _____ thousands.



- 3) The distance between Sun to our planet Earth is 149597870 kilometres.

Write this number in standard-form and number-name in International system.

Chapter 3

Addition and Subtractions



3.1:- Introduction:-

Shankar cultivated paddy in his two acres field. He wanted to know the cost of cultivation. He asked his daughter to write down the details of his expenditure. She wrote the details as follows.

Details of expenditure	Expenditure for 1 acre (₹)	Expenditure for 2 acres
Preparation of field	2545	
Seed bed and plantating	4507	
Removal of weeds	1235	
Fertilizers & pesticides	4700	
Harvesting	4125	
To heap and to winning	4675	

Now answer the following questions.

1. How much did Shankar invest on preparation of field for seed bed?
 2. How much did he spend on harvesting and to heap and winning?
 3. How much did he spend on seed bed and removal of weeds?
 4. What is the total cost of cultivation of paddy in 1 acre?
 5. What is the total cost of cultivation of paddy in 2 acres?
- Sambaiah, the brother of Shankar, has 1 acre of field.



Let's observe how much they spent together.

$$\begin{array}{r}
 \text{Shankar's expenditure} \\
 \text{Sambaiah's expenditure} \\
 \hline
 \end{array}
 \begin{array}{r}
 = 43574 \\
 = +21787 \\
 \hline
 \end{array}$$

This problem can be solved like this

3.2:- Process of Addition:-

Step 1: Adding ones, 4 ones + 7 ones = 11 ones
 = 1 ten + 1 one

Write 1 in ones column and carry one ten to the tens column.

T.Th	Th	H	T	O
			1	
4	3	5	7	4
2	1	7	8	7
				1

Step 2: Adding Tens, Ten (carried) + 7 tens + 8 tens
 = 16 tens = 1 hundred + 6 tens

Write 6 in tens column and
 1 hundred is carried to hundreds column.

T.Th	Th	H	T	O
		1	1	
4	3	5	7	4
2	1	7	8	7
			6	1

Step 3: Adding hundreds, carried 1 hundred +
 5 hundred + 7 hundreds = 13 hundreds
 = 1 thousand + 3 hundreds

Write 3 in hundreds column and
 1 thousand is carried to thousand column.

T.Th	Th	H	T	O
	1	1	1	
4	3	5	7	4
2	1	7	8	7
		3	6	1

Step 4: Adding thousands:-

$$1 \text{ thousand} + 3 \text{ thousands} + \text{one thousand (carried)} = 5 \text{ thousands}$$

Write 5 in thousands column.

T.Th	Th	H	T	O
	①	①	①	
4	3	5	7	4
2	1	7	8	7
	5	3	6	1

Step 5: Adding ten thousands column:-

$$4 \text{ Ten thousands} + 2 \text{ Ten thousands} = 6 \text{ Ten thousands}$$

Write 6 in ten thousands column.

So, the total cost of both rows is 65361.

T.Th	Th	H	T	O
	①	①	①	
4	3	5	7	4
2	1	7	8	7
6	5	3	6	1

Example 1: Add 52435 and 42567.

Solution: $52435 + 42567$

	T.Th	Th	H	T	O
		①	①	①	
	5	2	4	3	5
+	4	2	5	6	7
<hr/>					
	9	5	0	0	2

So, $52435 + 42567 = 95002$

Example 2: Add 326523 and 437582.

Solution: $326523 + 437582$

	L	T.Th	Th	H	T	O
		①	①	①		
	3	2	6	5	2	3
+	4	3	7	5	8	2
<hr/>						
	7	6	4	1	0	5

$3,26,523 + 4,37,582 = 7,64,105$



Do these

I) Do the following.

1) Add 20762 and 12225 2) Add 826532 and 153264 3) Add 286952 and 394256

II) Arrange in columns and add.

1) 932648 + 643578 + 376493 2) 763482 + 367842 + 567324

3) 673483 + 447862 + 663822 4) 25014 + 203101 + 2020

How much:

Mohan is proprietor of a meals canteen. He spent ₹ 31,787/- in January-2020 and earned ₹ 53,574/-. Calculate his gain in the month.

	T.Th	Th	H	T	O
Mohan earned in January:	5	3	5	7	4
He spent	:(-)	3	1	7	7

3.3:- Algorithm of 'Subtraction':-

Step 1: Subtract the ones. $7 > 4$ so, borrow one ten from tens place leaving behind 6 Tens.

Regroup 1 ten borrowed into 10 ones.

Now you have 10 ones + 4 ones = 14 ones.

$$14 \text{ ones} - 7 \text{ ones} = 7 \text{ ones}$$

Write 7 in the ones column.

T.Th	Th	H	T	O
			⑥	⑭
5	3	5	7	4
3	1	7	8	7
				7

Step 2: Subtract the tens. $8 \text{ tens} > 6 \text{ tens}$. So, borrow one hundred from hundreds column leaving behind 4 hundreds.

Regroup 1 hundred borrowed into 10 tens.

Now you have 10 Tens + 6 Tens = 16 Tens.

$$16 \text{ Tens} - 8 \text{ Tens} = 8 \text{ Tens}$$

Now, write 8 in tens column.

T.Th	Th	H	T	O
		④	⑮	⑭
5	3	5	7	4
3	1	7	8	7
			8	7

Step 3: Subtract hundreds column. $7 \text{ hundreds} > 4 \text{ hundreds}$. So borrow one thousand from thousand column.

Regroup 1 thousands borrowed into 10 hundreds.

You have 10 hundred + 4 hundreds = 14 hundreds

14 hundreds - 7 hundred = 7 hundreds.

Write 7 in hundreds column.

T.Th	Th	H	T	O
	②	⑭	⑮	⑭
5	3	5	7	4
3	1	7	8	7
		7	8	7

Step 4: Subtract the thousands column.

2 Thousands – 1 Thousand = 1 Thousand.

Write 1 in Thousands column.

T.Th	Th	H	T	O
		(14)	(16)	
	(2)	(4)	(6)	(14)
5	3	5	7	4
3	1	7	8	7
	1	7	8	7

Step 5: Subtract Ten thousands column.

5 Ten thousands – 3 Ten thousands

= 2 Ten thousands.

Mohan gained 21,787/- in the month

T.Th	Th	H	T	O
		(14)	(16)	
	(2)	(4)	(6)	(14)
5	3	5	7	4
3	1	7	8	7
2	1	7	8	7

Example 1: Subtract 26874 from 49543

Solution: $49543 - 26874$

	T.Th	Th	H	T	O
	4	9	5	4	3
-	2	6	8	7	4
<hr/>					
	2	2	6	6	9

$$49543 - 26874 = 22669$$

Example 2: By how much 2356 is less by 32564 than?

Solution: Subtract 2356 from 32564

$$32564 - 2356$$

	T.Th	Th	H	T	O
	3	2	5	6	4
-		2	3	5	6
<hr/>					
	3	0	2	0	8

2356 is less than 30208 from 32564

Do these

- $860438 - 764859$
 - $56080 - 4398$
 - $600005 - 65095$
 - $880056 - 45396$
 - $700000 - 75897$
 - $906004 - 473894$
 - $435217 - 383450$
 - $980000 - 573429$
 - $650701 - 404107$
- Subtract 76384 from 647836
 - Subtract 8437 from 783409
 - Subtract 386472 from 764986
 - Subtract 432010 from 705645
 - Subtract 607080 from 900000
 - Subtract 201781 from 400000

3.
 - a. What is to be added to 153672 to get 503267
 - b. What is to be added to 603257 to get 999999.
 - c. By how much 20325 is less than 425067?
 - d. How much is to be subtracted from 673267 to make it to 59325?

Cloth store:

Vanaja's family decided to purchase some garments on the occasions of her daughter's marriage. So she purchased some garments in APCo showroom. The billing details are as shown below.



Purchased garments	Total in ₹
Silk sarees	9899
Cotton sarees	6940
Silk panche	2785
Door curtains	8438
Bed sheets	5900
Towels	2350



1. How much money is spent on silk sarees more than that of door curtains?
2. How much less money is spent on bed sheets than cotton sarees?
3. How much money is spent on both silk sarees and silk panche?
4. How much money did Vanaja spend for door curtains, bed sheets and towels?
5. How much money did Vanaja spend for shopping?

Project Work

Collect the information about your village from your Panchayat office. And find out the sums.

Village Name:

Number of male	
Number of female	
Number of children	
Total	
Literates	
Illiterates	
Total	



Discuss with your teacher about the table.

Ex1. Find the difference of the largest 6-digit number and the largest 5-digit number.

$$\begin{array}{r}
 \text{6 digit largest number} \quad = \quad 9,99,999 \\
 \text{5 digit largest number} \quad = \quad - 99,999 \\
 \hline
 \quad \quad \quad \quad \quad \quad \quad \quad 9,00,000
 \end{array}$$

The difference = 9,00,000.

Ex:2 Find the sum of the smallest 6-digit odd number and the largest 5-digit even number.

$$\begin{array}{r}
 \text{The smallest 6 digit odd number} \quad = \quad 1,00,001 \\
 \text{The largest 5 digit even number} \quad = + \quad 99,998 \\
 \hline
 \quad \quad \quad \quad \quad \quad \quad \quad 1,99,999
 \end{array}$$

Their sum = 1,99,999.

3.4:-Addition and Subtraction facts:-

We know that $8 + 4 = 12$. We can derive two subtraction facts for this addition.

$$12 - 4 = 8 \text{ and } 12 - 8 = 4$$

We can write subtraction facts for addition of two large numbers also in the same way.

Example : $543267 + 153268 = 696535$

The subtraction facts that follow are...

696535	696535
$- 153268$	$- 543267$
543267	153268



For each subtraction, we can have only one addition fact.

Example : $14 - 8 = 6$, then the addition fact is $6 + 8 = 14$.

The addition fact for $323648 - 153267 = 170381$

is $170381 + 153267 = 323648$

170381
$+ 153267$
323648

Example : Simplify $234856 + 325416 - 384021$

Solution:

Step-1: Add the numbers having '+' sign.

Step-2: Subtract the third number from the sum obtained in step-1

<p>(1)</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #f9e79f;"> <th style="padding: 5px;">L</th> <th style="padding: 5px;">T.Th</th> <th style="padding: 5px;">Th</th> <th style="padding: 5px;">H</th> <th style="padding: 5px;">T</th> <th style="padding: 5px;">O</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">2</td> <td style="text-align: center; padding: 5px;">3</td> <td style="text-align: center; padding: 5px;">4</td> <td style="text-align: center; padding: 5px;">8</td> <td style="text-align: center; padding: 5px;">5</td> <td style="text-align: center; padding: 5px;">6</td> </tr> <tr> <td style="text-align: center; padding: 5px;">+ 3</td> <td style="text-align: center; padding: 5px;">2</td> <td style="text-align: center; padding: 5px;">5</td> <td style="text-align: center; padding: 5px;">4</td> <td style="text-align: center; padding: 5px;">1</td> <td style="text-align: center; padding: 5px;">6</td> </tr> <tr> <td colspan="6" style="border-top: 1px solid black;"></td> </tr> <tr> <td style="text-align: center; padding: 5px;">5</td> <td style="text-align: center; padding: 5px;">6</td> <td style="text-align: center; padding: 5px;">0</td> <td style="text-align: center; padding: 5px;">2</td> <td style="text-align: center; padding: 5px;">7</td> <td style="text-align: center; padding: 5px;">2</td> </tr> </tbody> </table>	L	T.Th	Th	H	T	O	2	3	4	8	5	6	+ 3	2	5	4	1	6							5	6	0	2	7	2	<p>(2)</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #f9e79f;"> <th style="padding: 5px;">L</th> <th style="padding: 5px;">T.Th</th> <th style="padding: 5px;">Th</th> <th style="padding: 5px;">H</th> <th style="padding: 5px;">T</th> <th style="padding: 5px;">O</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">5</td> <td style="text-align: center; padding: 5px;">6</td> <td style="text-align: center; padding: 5px;">0</td> <td style="text-align: center; padding: 5px;">2</td> <td style="text-align: center; padding: 5px;">7</td> <td style="text-align: center; padding: 5px;">2</td> </tr> <tr> <td style="text-align: center; padding: 5px;">- 3</td> <td style="text-align: center; padding: 5px;">8</td> <td style="text-align: center; padding: 5px;">4</td> <td style="text-align: center; padding: 5px;">0</td> <td style="text-align: center; padding: 5px;">2</td> <td style="text-align: center; padding: 5px;">1</td> </tr> <tr> <td colspan="6" style="border-top: 1px solid black;"></td> </tr> <tr> <td style="text-align: center; padding: 5px;">1</td> <td style="text-align: center; padding: 5px;">7</td> <td style="text-align: center; padding: 5px;">6</td> <td style="text-align: center; padding: 5px;">2</td> <td style="text-align: center; padding: 5px;">5</td> <td style="text-align: center; padding: 5px;">1</td> </tr> </tbody> </table>	L	T.Th	Th	H	T	O	5	6	0	2	7	2	- 3	8	4	0	2	1							1	7	6	2	5	1
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$$234856 + 325416 - 384021 = 176251$$

Exercise - 1

1) Do the following.

- a) $4986 + 3430 - 5467 = \dots\dots\dots$ b) $78645 - 36789 + 23576 = \dots\dots\dots$
 c) $40376 - 20568 - 76485 + 87364 = \dots\dots\dots$ d) $643857 + 467896 - 445386 = \dots\dots\dots$

2) Fill in the blanks.

Addition	Subtraction Fact - 1	Subtraction Fact - 2
$750 + 250 = 1000$	$1000 - 250 = \underline{\hspace{2cm}}$	$1000 - 750 = \underline{\hspace{2cm}}$
$650 + 150 = 800$	$800 - 650 = \underline{\hspace{2cm}}$	$800 - 150 = \underline{\hspace{2cm}}$
$66750 + 250 = 67000$		
$36750 + 250 = 37000$		

3. A man earns ₹ 37645/- in a month and his wife earns ₹ 25367. If they spend ₹ 38600/- in a month, how much do they save in that month?
4. Siva had ₹ 52,490. He purchased a cow for ₹ 15,870 and a buffalo for ₹ 25,785. How much money is with him now?
5. A milk dairy produces 25,545 litres of milk every day. It supplies 15,625 litres of milk to various milk depots and the rest to the market. How much milk is supplied to the market?

3.5:- Properties of addition:-

Property 1:

Ex: Add 2579 to 3275; and 3275 to 2579.

First we add 3275

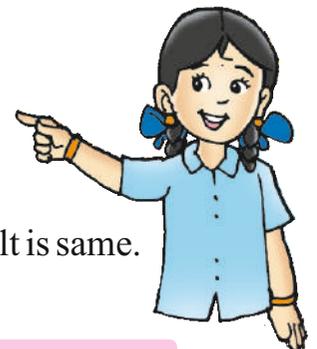
$$\begin{array}{r} + 2579 \\ \hline 3275 \\ \hline 5854 \end{array}$$

Then we add 2579

$$\begin{array}{r} + 3275 \\ \hline 2579 \\ \hline 5854 \end{array}$$

If we change the order of 2579 and 3275 as shown above, the result is same.

Thus, $2579 + 3275 = 3275 + 2579 = 5854$.



☛ *Changing the order of the two addends does not change the total.*

Property 2:

Let us add 9213 to 0 and also add 0 to 9213.

$$\begin{array}{r} \text{We have} \qquad \qquad \qquad 0 \qquad \qquad \qquad 9213 \\ \qquad \qquad \qquad \qquad \qquad + 9213 \qquad \qquad \qquad + \quad 0 \\ \hline \qquad \qquad \qquad \qquad \qquad 9213 \qquad \qquad \qquad 9213 \end{array}$$

From the above example you may know that, by adding 0 to any number you will get the same number.

Thus $9213 + 0 = 9213 + 0 = 9213$.

☛ *If we add a number to 0, we get the number itself.*

3.6:- Subtraction across zero:-

Ex:1 Subtract 100 from 1000.

Th	H	T	O
1	<u>10</u> 0	0	0
-	1	0	0
<hr/>			
	9	0	0

Borrow 1 thousand from the thousands place leaving behind thousands.

1 thousand = 10 hundreds

Now subtract column wise.

Ex:2 Subtract 1 from 1000

Th	H	T	O
1	<u>9</u>	<u>9</u>	<u>10</u>
-			1
<hr/>			
	9	9	9

1 thousand = 10 hundreds

10 hundreds = 9 + 1 hundreds

1 hundred = 10 tens... so, on.

10 tens = 9 tens + 1 ten

1 ten = 10 ones

Now, subtract column wise.

Do this

I) Fill in the blanks using addition properties.

1. $35 + 67 = 67 + \dots\dots\dots$

2. $378 + 894 = \dots\dots + \dots\dots$

3. $889 + 0 = \dots\dots\dots$

4. $0 + \dots\dots = 6592 + \dots\dots\dots$

5. $7634 + 3210 = \dots\dots + 7634$

6. $9345 + - = 4537 + \dots\dots\dots$



Exercise - 2

Workout the following:

1. Cost of pesticide sprayer is ₹ 4500/-. Government provides a subsidy of ₹ 2900/-. How much farmer has to pay from his pocket?
2. What is the difference of largest 5 digit number and smallest 6 digit number?
3. A man earned ₹ 4,75,000 in a year. He spent ₹ 3,85,600. How much money did he save?
4. There are 3,25,208 men; 3,18,405 women and 2,98,405 children in a town. What is the total population of the town?
5. In a district 36,405 students were passed in S.S.C examinations. If the number of failed students were 4,305 find the total number of students appeared for the examination.
6. Padmaja's income was ₹ 5,35,256 in 2018. Next year her income exceeded the previous year's income by ₹ 78,500. What was her income in the year 2019? How much did she earn in these two years?

3.7:- Estimating sums and differences:-

To estimate sum or difference, first round off each number to its nearest tens, hundreds or thousands as per the number of digits in the numbers and then add or subtract.

Estimating Large numbers

Estimate the sum or difference by rounding off each number to the nearest ten thousand.

Example :

$$\begin{array}{r} 62014 \text{} \quad 60000 \\ + 85703 \text{} \quad + 90000 \\ \hline \quad \quad \quad 150000 \\ \hline \end{array}$$
$$\begin{array}{r} 85703 \text{} \quad 90000 \\ - 62014 \text{} \quad - 60000 \\ \hline \quad \quad \quad 30000 \\ \hline \end{array}$$



Estimate, the answer by rounding off. Do addition or subtraction according to the problem given. One is done for you.

Example:

Baba had ₹ 7844/- in his bank account. His expenditure is ₹ 2257/-. Estimate the remaining balance in his bank account.

₹ 8000 ₹ 9000 ₹ 10000 ₹ 6000

1. Raghu went to Rythu bazar and bought some vegetables worth ₹ 158/- , grocery worth ₹ 143/-. How much he spent approximately?

₹ 200 ₹ 300 ₹ 400 ₹ 500

2. Raju bought a mobile for ₹ 7890/- and a chair for ₹ 3295/-. Estimate how much did he pay more for the mobile.

₹ 4000 ₹ 3000 ₹ 1000 ₹ 5000

3. Haseena bought a saree for ₹ 5345/- and a shirt for ₹ 2050/-. Estimate the amount she has to pay to the shop keeper approximately.

₹ 5000 ₹ 4000 ₹ 7000 ₹ 2000

4. Bunny scored 6,776 points on a video game and Baba scored 2,373 points. Estimate the difference of the scores of Bunny and Baba approximately.

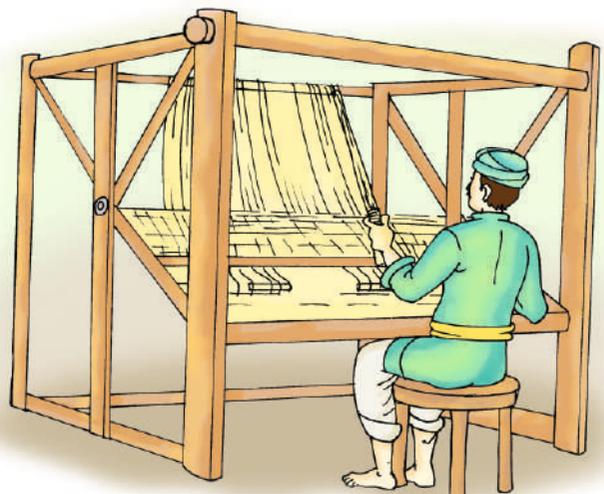
5000 8000 7000 6000

5. Lakshmi is reading a book that contain 257 pages. She has already read 163 pages. Estimate how many pages are yet to be read approximately?

600 900 100 70

3.8:- Profit and Loss:-

A weaver weaves sarees on his handloom and sells them in market. He buys cotton, thread, silk thread, Jery silk...etc. from a whole-seller. He sells them at a profit and sometimes at a loss. He weaves costly sarees on the orders of consumers. He can weave a cotton-saree within two days and a silk saree in 4 to 5 days. Now let's see his cost of measuring each saree.



Cotton saree	
Cotton thread	- ₹ 300/-
Jerry	- ₹ 200/-
Weaving charge	- ₹ 400/-
Total:	₹ 900/-

Silk saree	
Silk thread	- ₹ 2500/-
Jerry	- ₹ 1000/-
Weaving charge	- ₹ 2000/-
Total:	₹ 5,500/-

1. Weaver sells cotton saree for ₹ 1100/-. Does he make a profit or a loss?
2. Weaver sells damaged cotton saree for ₹ 400/- each. Does he make a profit or a loss?
3. Weaver sells silk sarees for ₹ 6000/-. Does he make a profit or a loss? Cotton or Silk?

Example :

A shop keeper purchases cotton sarees at the rate of ₹ 1200/- and silk sarees for ₹ 7000/- from a weaver. He sells those for ₹ 1400/- and ₹ 8500/- respectively.

Cost price of the cotton saree = ₹ 1200

Selling price of the cotton saree = ₹ 1400

What is your observation about silk saree?

The cost price of the silk saree = ₹ 7000

The selling price of the silk saree = ₹ 8500



What is your observation?

In both the cases, the selling price is higher than the cost price. So, he is getting more amount than the cost price, this is called profit. To know this, we have to subtract the cost price from the selling price.

$$\text{Profit} = \text{Selling Price} - \text{Cost Price}$$

We can gain if the selling price is more than cost price. Then the difference is profit. Some cotton sarees are damaged or colours faded. So, such sarees were sold for 800 each at a loss.

The cost price of the cotton sarees = ₹ 1200

The selling price of the cotton saree = ₹ 800

What is your observation?

In above case, selling price is lesser than the cost price. To know, how much less amount is getting than the cost price, we subtract selling price from cost price.

$$\text{Loss} = \text{Cost Price} - \text{Selling Price}$$

We get loss if the cost price is more than selling price. If the selling price is high, then we will get profit.

Example -1: A cycle shop owner bought a cycle worth ₹ 1500 and sold it for ₹1350. Then, find whether the owner gets profit or loss, by how much?

Solution: Cycle's cost price = ₹1500

Cycle's selling price = ₹1350

Cost price is higher than the selling price. So, he gets loss.

$$\text{Loss} = \text{Cost price} - \text{Selling price}$$

$$= 1500 - ₹1350$$

$$= 150$$

Example -2: Amar is a gold merchant. He bought 10 gms of gold for ₹ 28000/-. Now its rate has gone up to ₹ 40,000/-. Will Amar make a profit or a loss on selling the gold, by how much?

Solution: Cost price of 10 g Gold = ₹ 28000

Present rate = ₹ 40000

Present rate is high. So he gets profit.

$$\text{Profit} = \text{Present rate} - \text{Cost price}$$

$$= ₹ 40000 - ₹ 28000$$

$$= ₹ 12000$$

Exercise - 3

Find the amount of profit or loss for the following problems.

1. Cost price of rice bag = ₹ 750; selling price = ₹ 900
2. Cost price of bed sheet = ₹ 635; selling price = ₹ 815
3. Cost price of umbrella = ₹ 105; selling price = ₹ 90
4. Cost price of a fan is ₹ 800 and by selling it, Ravi got a profit of ₹ 250. What is its selling price?
5. Cost price of a motor cycle is ₹ 42500/- and by selling it, Ajay got a loss of ₹ 1800. What is its selling price?
6. A thermos flask is purchased for ₹ 450 by a shopkeeper. He wants a profit of ₹ 50. What should be its selling price?
7. Rekha and Geetha went to a movie. Rekha bought two tickets for ₹ 120. Geetha bought two pop-corn packets at the rate of ₹ 30 for each. How much money did Rekha spend more than that of Geetha?





Mr. Raju is a farmer. He is constructing a new house. He purchased the needed material to build the house like sand, cement, iron, gravel and bricks.



The expenses are as mentioned below.

S. No.	Item	Unit	Cost per unit	No. of units
1	Sand	Tractor truck	₹ 1000 (1 Tractor)	3
2	Cement brick	Brick	₹ 16 (1 Brick)	500
3	Iron	Kg	₹ 50 (1 kilo)	122 kilos
4	Cement	Bag	₹ 356 (1Bag)	50
5	Gravel	Tractor truck	₹ 3000 (1 tractor)	2

How much amount was spent on these primary things?

	Cost per unit		Number of unit		Total amount
1. Sand	<input type="text"/>	×	<input type="text"/>	=	<input type="text"/>
2. Cement bricks	<input type="text"/>	×	<input type="text"/>	=	<input type="text"/>
3. Iron	<input type="text"/>	×	<input type="text"/>	=	<input type="text"/>
4. Cement	<input type="text"/>	×	<input type="text"/>	=	<input type="text"/>
5. Gravel	<input type="text"/>	×	<input type="text"/>	=	<input type="text"/>

Then Raju asked Babu to send masons, helpers and labours to work on daily wage. The details are given below.

S. No.	Workmanship	Wage per day
1	Mason	₹ 575
2	Helper	₹ 475
3	Labour	₹ 350



After the completion of 31 days of work, Sai who is the son of Babu calculated the amount given to the Mason as shown below:

Days wage	500	70	5
30	$500 \times 30 = 15000$	$70 \times 30 = 2100$	$5 \times 30 = 150$
1	$500 \times 1 = 500$	$70 \times 1 = 70$	$1 \times 5 = 5$

$$\text{Total : } 15000 + 2100 + 150 + 500 + 70 + 5 = ₹ 17825$$

But Sai's brother Harsha calculated the same in another way as shown below.

$$\text{One day labor wage to mason} = ₹ 575$$

$$\text{31 days labor wage to mason} = ₹ 575 \times 31$$

$$= (500 + 70 + 5) \times 31$$

$$= (500 \times 31) + (70 \times 31) + (5 \times 31)$$

$$= 15500 + 2170 + 155$$

$$= ₹ 17825$$

When they showed the two methods to their mother Jaya, she said, “both are correct but I will explain you another method.”

Wage for 31 days to Mason

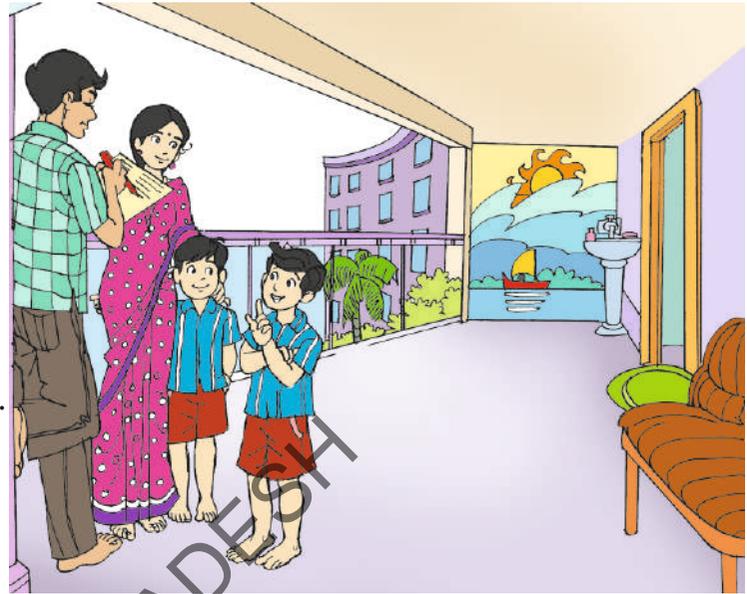
$$\begin{array}{r} = ₹ \quad 575 \times 31 \\ \quad 575 \quad \text{-----} (575 \times 1) \\ + 17250 \quad \text{-----} (575 \times 30) \\ \hline ₹ 17825 \end{array}$$

Which method do you like?

Example:

Find the labour wage of helper for 23 days.

$$\begin{array}{r} ₹ 475 \times 23 \\ \hline 1425 \quad \text{-----} (475 \times 3) \\ + 9500 \quad \text{-----} (475 \times 20) \\ \hline ₹ 10925 \end{array}$$



Do this

Do the followings.

- | | | | | |
|--------------------|--------------------|--------------------|--------------------|--------------------|
| a) 127×12 | b) 245×17 | c) 346×19 | d) 495×24 | e) 524×36 |
| f) 642×43 | g) 729×56 | h) 867×69 | i) 963×72 | j) 806×83 |

Raju completed his house construction. He made a list of his relatives. He wanted to invite 1256 members to 'house warming'. He consulted a printing press to print the invitation cards at ₹7 each.

Raju calculated the total amount as shown below.

$$\begin{array}{l} \text{The cost of one invitation card} \quad = ₹ 7 \\ \text{Members to be invited} \quad = 1256 \\ \text{Total amount to be paid to the press owner} = 1256 \times 7 \\ \quad \quad \quad \quad \quad \quad \quad \quad = ₹ 8792 \end{array}$$

Multiplicand X Multiplier
= Product



Process of Multiplication: - 1256×7

Step 1:

We start multiplication from ones place.

Multiply number 6 (which is in ones place of multiplicand) by 7 (multiplier) $6 \times 7 = 42$

Write 2 (the digit in ones place of this product), under 6 (ones place in 1256).

Write 4, the rest of the digit in 42, above 5 (tens place in 1256).

$$\begin{array}{r} 4 \\ 1256 \times 7 \\ \hline 2 \end{array}$$

Step 2:

Now multiply the digit 5 which is in tens place by 7. $[7 \times 5 = 35]$

Add 4 which is above 5 to this result. $35 + 4 = 39$.

Now write 9 under 5 [tens place in 1256] and write 3 above

2 [hundreds place in 1256].

$$\begin{array}{r} 34 \\ 1256 \times 7 \\ \hline 92 \end{array}$$

Step 3:

Multiply the digit 2 which is in hundreds place by 7. $[7 \times 2 = 14]$

Add 3 which is above 2 to this result. $14 + 3 = 17$.

Now write 7 under 2 [hundreds place in 1256] and 1 above

1 [thousands place in 1256].

$$\begin{array}{r} 134 \\ 1256 \times 7 \\ \hline 792 \end{array}$$

Step 4:

Multiply 1 which is in thousands place by 7. $[7 \times 1 = 7]$

Add 1 which is on 1 to the result. $7 + 1 = 8$.

Now write 8 under 1 [Thousands place in 1256].

$$\begin{array}{r} 134 \\ 1256 \times 7 \\ \hline 8792 \end{array}$$

Do these

1) Do the followings

- a) 2835×3 b) 3746×5 c) 45392×6 d) 56042×8 e) 63672×9
f) 786435×6 g) 79480×7 h) 832407×6 i) 989235×4 k) 905068×8

2) A factory manufactures 4950 cars in a month. How many cars will the factory produce in a year?

3) If a train travels 143 kilometres in an hour, how far will it travel in one day?

Raju's wife Devi wanted to buy gifts for 1256 guests. She went to market and bought steel boxes each costs at ₹ 34. Devi calculated the total amount to pay the shop keeper like this.

$$\begin{array}{r}
 1256 \times 34 \\
 \hline
 5024 \quad \text{-----} \quad (1256 \times 4) \\
 + 3768 \quad \text{-----} \quad (1256 \times 3) \\
 \hline
 42704
 \end{array}$$

Note: When multiplying with the digit in 10s place of the multiplier, we begin writing the product under the tens place of the previous product.

On the day of house warming, Raju planned to arrange meal to the guests. Raju met the Caterer Mastan agreed for ₹ 125 per each plate.

1101 members attended on that day. How much amount Raju has to pay?

Sol: Number of guests attended = 1101
 Cost of each plate of meal = ₹125
 Total amount to be paid = ₹ 1101 × 125
 = ₹ 137625



$$\begin{array}{r}
 1101 \times 125 \\
 \hline
 5505 \quad \text{-----} \quad (1101 \times 5) \\
 2202 \quad \text{-----} \quad (1101 \times 2) \\
 + 1101 \quad \text{-----} \quad (1101 \times 1) \\
 \hline
 137625
 \end{array}$$

Example:

If 2364 members attended the function and the cost of one plate of meal was ₹132, how much amount could Mastan get?

Total members attended to the function = 2364
 Cost of one plate meal = ₹ 132
 Total amount Mastan got = ₹ 312048

$$\begin{array}{r}
 2364 \times 132 \\
 \hline
 4728 \quad \text{-----} \quad (2364 \times 2) \\
 7092 \quad \text{-----} \quad (2364 \times 3) \\
 + 2364 \quad \text{-----} \quad (2364 \times 1) \\
 \hline
 312048
 \end{array}$$

RIDDLE



I am a 3-digit number.
 My ones digit is 3 times to my hundreds digit.
 Divide my ones digit by 2 to get my tens digit.
 My hundreds digit is the smallest prime number. Who am I?

Example:

Mr. Raju's monthly salary is ₹31,224. What is his annual income?

Sol:

$$\begin{aligned}\text{Mr. Raju's salary for one month} &= 31224 \\ \text{His salary for one year} &= 31224 \times 12 \\ &= ₹374688\end{aligned}$$

$$\begin{array}{r} 31224 \times 12 \\ \hline 62448 \\ + 312240 \\ \hline 374688 \end{array}$$

Making of word problems:

Example:

Prepare a word problem by using 12×127

Problem: Balu wants to plant 12 tomato plants in a row. The total number of rows are 127. How many tomato plants can be planted in the field?

Try these

- Do the following multiplications and prepare word problem.
 - 3628×9
 - 1507×69
 - 4256×76
 - 27041×8
 - 4230×121
 - 8271×93
- The tea seller Amar sells a cup of tea for ₹ 6. If 1100 cup of teas was served on a day, how much amount did he earn on that day?
- Carpenter Johnson made 9 cots and sold each cot for ₹ 8,500. How much amount did he earn?
- Mr. Kiran works as a scavenger in Mydukuru municipality. His salary for one month is ₹18,000. What is his annual salary? Which mathematical operation can you use to solve this problem?

4.2:- Properties of multiplication:-

Property 1: Commutative property

Do the following.

$$\begin{array}{ll} 1) 426 \times 24 = \underline{\hspace{2cm}} & 24 \times 426 = \underline{\hspace{2cm}} \\ 2) 4258 \times 23 = \underline{\hspace{2cm}} & 23 \times 4258 = \underline{\hspace{2cm}} \\ 3) 9242 \times 75 = \underline{\hspace{2cm}} & 75 \times 9242 = \underline{\hspace{2cm}} \end{array}$$



What do you observe?

The product of two given numbers remains the same even if their order is changed. This is known as commutative property of multiplication.



Property 2: Multiplicative Identity

Do the following.

1) $89 \times 1 =$ _____

2) $261 \times 1 =$ _____

3) $4589 \times 1 =$ _____



What do you observe?



The product of any number and 1 is the number itself. 1 is multiplicative identity.

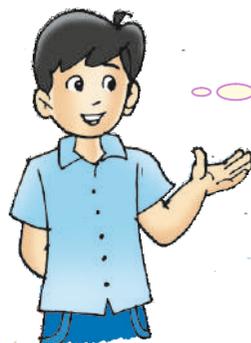
Property 3: Zero property of multiplication

Do the following.

1) $56 \times 0 =$ _____

2) $258 \times 0 =$ _____

3) $0 \times 953 =$ _____



What do you observe?



The product of any number and zero is always zero. This is known as zero property of multiplication.

Do this

1. Find the products: 46×23 and 23×46 .

2. Do the following:

a) $23 \times 1 =$ _____

b) $342 \times 1 =$ _____

c) $999 \times 1 =$ _____

d) $53 \times 0 =$ _____

e) $259 \times 0 =$ _____

f) $5817 \times 0 =$ _____

Let us Estimate:

There were 18 members in Ramu's family. His friend Shafi wanted to buy coconuts for them on a festival day. The cost of one coconut was ₹ 32. He asked his grandson Rahim to estimate the amount of 18 coconuts.

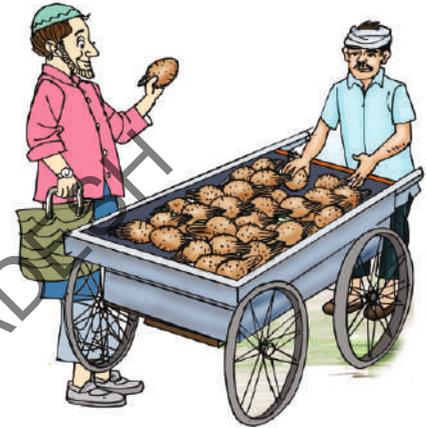
Rahim estimated as follows.

$$\begin{aligned} \text{Total amount} &= 32 \times 18 \\ &= 30 \times 20 \dots\dots\dots (32 \rightarrow 30) \\ &= 600 \dots\dots\dots (18 \quad 20) \end{aligned}$$

Did Rahim estimate correctly?

Observe the estimations:

47×29	\longrightarrow	$50 \times 30 =$	1500
72×98	\longrightarrow	$70 \times 100 =$	7000
167×19	\longrightarrow	$170 \times 20 =$	3400
396×78	\longrightarrow	$400 \times 80 =$	32000
3241×212	\longrightarrow	$3000 \times 200 =$	600000



18×32
 $20 \times 30 = 600$ The multiplier and multiplicand are rounded off to near tens.

Here multiplicand and multiplier are rounded off to nearest 10s, 100s and 1000s.



Do this

Estimate the product of these multiplications.

1) 59×19

2) 99×56

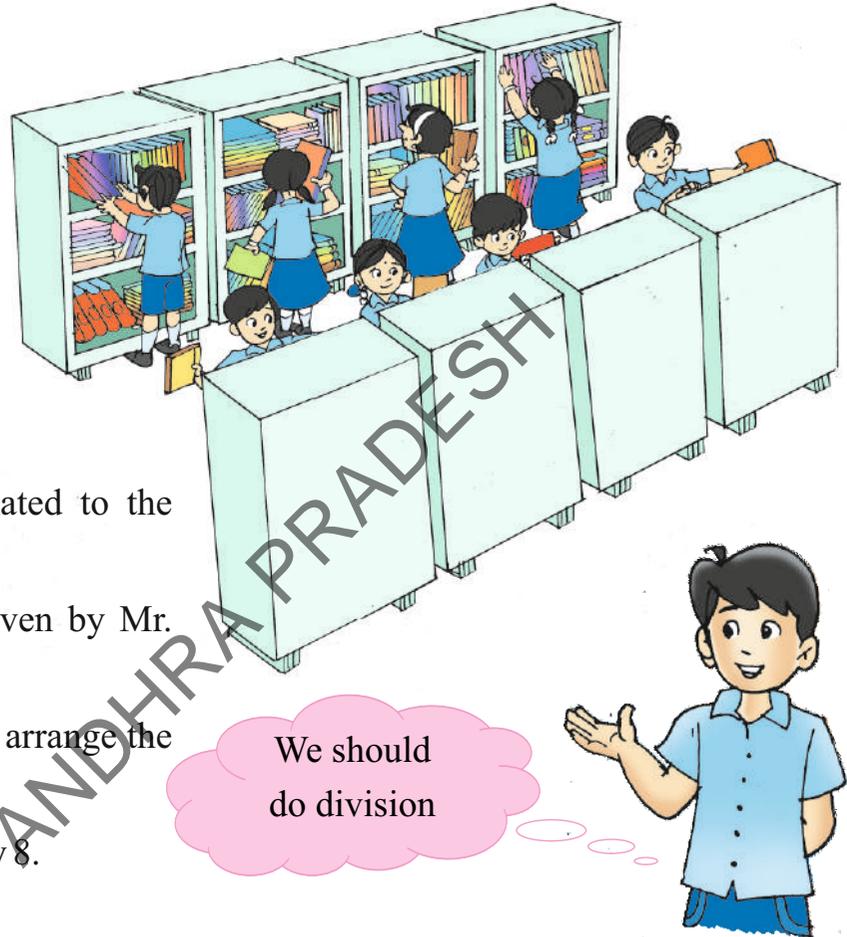
3) 189×33

4) 4123×316

4.3:- Division:-

Mr. Raju donated 9984 books and 8 almirahs to Mandal Parishad Primary school library. Teacher asked the 5th class students to arrange the books equally in the 8 almirahs.

1. How many books were donated to the library?
2. How many almirahs were given by Mr. Raju?
3. What operation is required to arrange the books equally in almirahs?
4. Let's see how to divide 9984 by 8.



Step 1:

We begin from the left, i.e., with the thousands.

Divide 9 (the digit in thousands place) by 8.

Estimate the highest multiple of 8, which can be subtracted from 9 completely.

Clearly, $8 \times 1 = 8$ and $8 \times 2 = 16$.

As, $8 < 9$ while $16 > 9$.

We take $8 \times 1 = 8$.

Write 1 in the quotient.

Subtract 8 from 9.

Bring down 9, the digit in the hundreds place.

Now, 1 thousand and 9 hundreds make 19 hundreds.

$$\begin{array}{r} 8) 9984(1 \\ - 8 \\ \hline 19 \end{array}$$

Step 2:

Divide 19 hundreds by 8.

Estimate the highest multiple of 8 which can be subtracted from 19 completely.

Clearly, $8 \times 2 = 16$ and $8 \times 3 = 24$.

As, $16 < 19$ while $24 > 19$.

We take $8 \times 2 = 16$.

Write 2 next to the previous quotient.

Subtract 16 from 19. We get 3.

Bring down 8, the digit in 10s place.

Now, 3 hundreds and 8 tens make 38 tens.

$$\begin{array}{r} 8) 9984 (12 \\ - 8 \\ \hline 19 \\ - 16 \\ \hline 38 \end{array}$$

Step 3:

Divide 38 tens by 8.

Estimate the highest multiple of 8 which can be subtracted from 38.

Clearly, $8 \times 4 = 32$ and $8 \times 5 = 40$.

As, $32 < 38$ while $40 > 38$.

we take $8 \times 4 = 32$.

Write 4 next to the previous quotient.

Subtract 32 from 38. We get 6.

Bring down 4 ones.

Now, 6 tens and 4 ones make 64 ones.

$$\begin{array}{r} 8) 9984 (124 \\ - 8 \\ \hline 19 \\ - 16 \\ \hline 38 \\ - 32 \\ \hline 64 \end{array}$$

Step 4:

Divide 64 ones by 8.

Clearly, $8 \times 8 = 64$.

Write 8 next to the previous quotient.

Subtract 64 from 64. We get 0.

$$\begin{array}{r} 8) 9984 (1248 \\ - 8 \\ \hline 19 \\ - 16 \\ \hline 38 \\ - 32 \\ \hline 64 \\ - 64 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 1248 \\ 8 \overline{) 9984} \\ \underline{8} \\ 19 \\ \underline{16} \\ 38 \\ \underline{32} \\ 64 \\ \underline{64} \\ 0 \end{array}$$

Example - 1

Fourteen agricultural workers earned ₹ 5978 in a day as daily wage. How much amount each one will get?

Solution:

Number of agricultural workers = 14
Amount earned = ₹ 5978
Amount each one will get = ₹ 427

$$\begin{array}{r} 14 \overline{) 5978} \quad (427 \\ \underline{-56} \\ 37 \\ \underline{-28} \\ 98 \\ \underline{-98} \\ 0 \end{array}$$

Thus, Quotient = 427
Remainder = 0

Example - 2

What is the remainder if you divide 19895 with 21?

Solution :

$$\begin{array}{r} \text{Dividend} \\ \text{Divisor } 21 \overline{) 19895} \quad (947 \text{ Quotient} \\ \underline{-189} \\ 99 \\ \underline{-84} \\ 155 \\ \underline{-147} \\ 8 \text{ Remainder} \end{array}$$

Thus quotient = 947

Remainder = 8

We know that,
relation between divisor, dividend,
quotient and remainder is

$$\text{Dividend} = (\text{Divisor} \times \text{Quotient}) \\ + \text{Remainder}$$



Let's verify the solution whether correct or not by using the division relation.

$$\text{Dividend} = (\text{Divisor} \times \text{Quotient}) + \text{Remainder}$$

$$19895 = (947 \times 21) + 8$$

$$19895 = 19895$$

Do these

- 1) Do the following and write dividend, divisor, quotient and remainder and verify the answer with division relation.
a) $97869 \div 6$ b) $56821 \div 9$ c) $68072 \div 7$ d) $10213 \div 17$
- 2) Raja bought 120 blankets with ₹ 6000 to distribute to orphans. What is the cost of each blanket?
- 3) Vemaiah bought 100 bread packets to distribute to patients with ₹ 2300. What was the cost of each bread packet?

Try this

Do the following and write your observation.

$53427 \div 10,$

$53427 \div 100,$

$53427 \div 1000,$

$53427 \div 10000$

4.4:- Unitary – Method:-

The unitary method is a process in which you find the value of one unit and then the value of a required number of units.

Example: Murali sells 10 guavas for ₹ 50. What would be the price of 7 guavas?

Sol:

Cost of 10 guavas	= ₹ 50
Cost of 1 guava	= ₹ 50 ÷ 10
	= ₹ 5
Cost of 7 guavas	= ₹ 5 × 7
	= ₹ 35.

Do these

1. If 8 pots cost is ₹ 800, what is the cost of 5 pots?
2. If 5 kilos tomatoes cost is ₹ 125, what would be the cost of 2 kilos tomatoes?
3. A publisher makes 3,875 books in the month of July. If they make the same number of books every day, then how many books can they make in a leap year?

Activity

Solve the given problems and colour the answers in the following grid of numbers.

21×16

15×7

181×5

$576 \div 12$

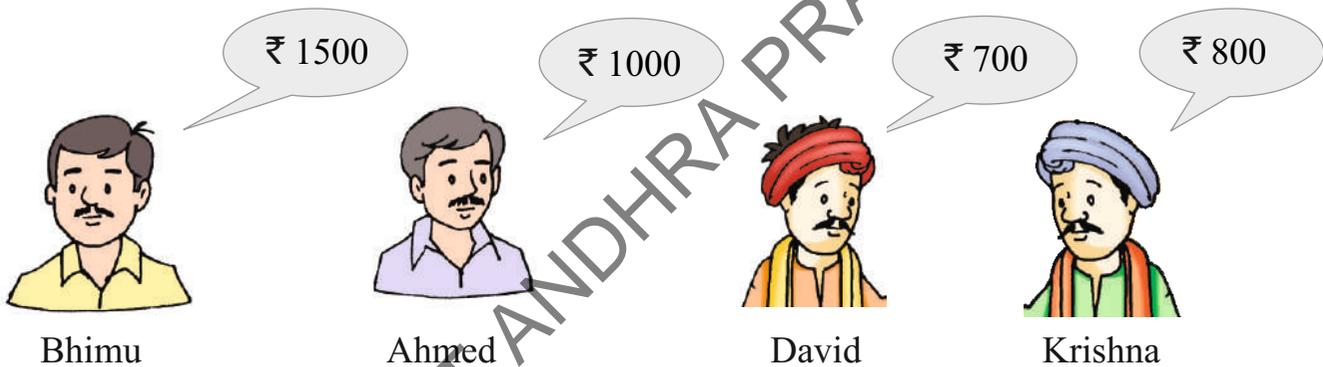
$288 \div 4$

$78 \div 3$

717	1001	105	3128	123
919	81	165	100	336
709	48	85	72	71
905	676	500	121	26

Let's Estimate:

4 Labourers agreed to work for ₹ 4250 to mow landlord's field. Each of them estimated the amount they going to receive individually. Observe their estimations.



Whose estimation is correct?

If we round off ₹ 4250 to the nearest thousands, we get ₹ 4000. If 4000 divided by 4, each one gets ₹ 1000.

Ex: The Mandal Educational Officer of Mopidevi Mandal wanted to take 1895 children to a science fair. If each bus can carries 48 students, estimate the number of buses required.

To estimate the quotient in the division of two numbers, we have to round off the divisor or dividend or both to nearest multiples of 10s, 100s and 1000s etc. whichever makes the division easier.

$$\begin{aligned}\text{Number of Buses required} &= 1895 \div 48 \\ &= 2000 \div 50 \\ &= 40\end{aligned}$$

Do this



1. Estimate the result.

a) $309 \div 11$

b) $497 \div 23$

c) $891 \div 32$

d) $2940 \div 32$

e) $6121 \div 52$

f) $2928 \div 92$

2. Jonny bought 5 packets of buns each containing 20 buns to distribute on his birthday. He went to a hospital to distribute the buns. There were 48 patients. Estimate how many buns each patient will get?

4.5:- Relation between multiplication and division:-



Kavya! Do you know? I can write two divisions corresponding to every multiplication.

Write division for this multiplication.

$$15 \times 3 = 45$$



Corresponding divisions

$$45 \div 3 = 15, 45 \div 15 = 3$$

$$\text{Multiplier} \times \text{Multiplicand} = \text{Product}$$

$$\text{Multiplier} = \text{Product} \div \text{Multiplicand}$$

$$\text{Multiplicand} = \text{Product} \div \text{Multiplier}$$

Look at the table and fill in the blanks:

Multiplication	Corresponding Division form 1	Corresponding Division form 2
$10 \times 2 = 20$	$20 \div 2 = 10$	$20 \div 10 = 2$
$23 \times 4 = 92$		$92 \div 23 = 4$
$52 \times 12 = 624$	$624 \div 12 = 52$	
$500 \times 40 = 2000$		$2000 \div 500 = 40$
$36 \times 18 = 648$		
$5027 \times 15 = 7605$		



Ramya! Now tell me one division, I will tell the corresponding multiplication form.

$18 \div 2 = 9$



The corresponding multiplication form is $9 \times 2 = 18$.

Look at the following table and write multiplication – forms for the following divisions.

Division form	Multiplication form
$54 \div 6 = 9$	$9 \times 6 = 54$
$168 \div 12 = 14$	$14 \times 12 = 168$
$792 \div 22 = 36$	
$200 \div 5 = 40$	
$1265 \div 23 = 55$	
$2262 \div 39 = 58$	



Exercise

1. Ahmmad earns ₹ 9500 per month. How much amount he earns in a year?
2. 2488 families are living in a major panchayath. If each family pays ₹ 30 per year towards library cess, how much amount will be collected? Write the process to find the collected amount.
3. The cost of a bicycle is ₹ 3950. The cost of a motor cycle is 13 times to bicycle's cost. What is the cost of the motor cycle?
4. A carton can hold 36 mangoes. How many such cartons are required if there are 30,744 mangoes in all?
5. Mr. Mani wants to distribute ₹ 64,000 equally among 8 of his workers towards their wages. How much will each worker get?
6. The owner of a cell phone shop bought 8 cell phones of same cost and he gave ₹ 90,000 to wholesaler. The wholesaler returned him ₹ 400. What is the cost of each cell phone?
7. 28 laddus weigh 1kg. How many laddus weigh 12 kgs. If 16 laddus can be packed in one box, how many boxes are needed to pack all these laddus ?
8. A fisher man wants to sell 8kg of fish for ₹1600. But Ramu wants to buy 5kg only. Find the cost for 5 kg.
9. 50kgs of jaggery costs ₹2500. What is the cost of 15 kg jaggery?
10. If a family requires ₹ 3200 for 8 days, how much money does the family require for 4 days?
11. Harsha painted pictures and sold them in an art show. He charged ₹ 2567 for big painting and ₹465 for small painting. He sold 6 large paintings and 3 small paintings. How much amount did he earn in the art show?
12. The cost of 63 erasers is ₹315. What will be the cost of 45 erasers?
13. 12 meters of shirt cloth costs ₹ 1440. What will be the cost of 7 meters of such cloth?

Fun with maths

Observe and continue it...

$$1 \times 1 = 1$$

$$121 \times 1 = 11 \times 11$$

$$12321 \times 1 = 111 \times 111$$

$$1234321 \times 1 =$$

.....

.....

$$1 \times 9 = 9$$

$$12 \times 9 = 108$$

$$123 \times 9 = 1107$$

$$1234 \times 9 =$$

.....

.....



5.1:- Divisibility rules:-

Bindu and Ramu are playing Mathematics games. When Ramu tells any number, Bindu replies whether the number is divisible by any of the numbers 2, 5 or 10 without making division.

Ramu : 2438

Bindu : It is divisible by 2. But not divisible by 5 and 10.

Ramu : 2535

Bindu : It is divisible by 5, but not divisible by 2 and 10.

Ramu : 3460

Bindu : It is divisible by 2, 5, and 10.

Ramu : 3607

Bindu : It is not divisible by 2, 5 and 10.

When a number is divided by another number leaving remainder zero, then we say that the first number is **divisible** by the second number.



How could **Bindu** tell without doing actual division?

Divide the numbers with 2 to find out which of the following numbers are exactly divisible by 2. Observe which numbers are not divisible?

2410	1282	3784	6728
5633	1789	5466	1787

Which of the above numbers are exactly divisible by 2?

_____, _____, _____, _____, _____

Observe the units place of the numbers, which are divisible by 2.

_____, _____, _____, _____, _____

Are all these numbers even numbers? yes / no

So a number is divisible by 2, if the digit at its ones place is either 0/2/4/6/8.

All even numbers are exactly divisible by 2.

Do these

1) Circle the following numbers which are divisible by 2.

2469	7435	8496	7630	4301	8023
4678	2030	2224	7972	6120	1524

2) Write any 5, four-digit numbers which are divisible by 2.

Divisibility rule of 5:-

Ramu : What is the divisibility rule of 5?

Bindhu : Say some multiples of 5

Ramu : 5, 10, 15, 20, 25, 30, 35

Bindhu : Observe and write the digits at the ones place of the multiples of 5.

_____, _____

Do you know?

All the multiples of a given number are divisible by that number.

A number is divisible by 5, if the digit at its ones place is either 0 or 5.

Which number is not divisible by 5 in 235, 228? Why?

228 is not divisible by 5.

Its unit's place is not 0 or 5.

235 is divisible by 5

Since its unit's place has 5.

Divisibility rule of 10:

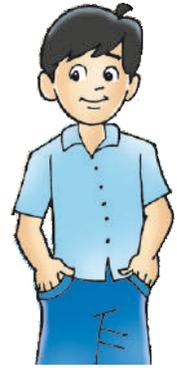
Ramu says 10 divisibility rule like this.

Multiples of 10 are 10, 20, 30, and so on.

In the above all multiples of 10, the digit in unit's place is 0.

All multiples of 10 are divisible by 10.

Observe below table....



Number	Units place	Divisible by 10	Not divisible by 10	Reason
274	4		✓	Units place don't have zero
3740	0	✓		Units place has zero
404050	0	✓		Units place has zero
50250	0	✓		Units place has zero

The numbers which have zero at their ones place are exactly divisible by 10.

Exercise - 1

- Find the numbers which are divisible by 2. Write the reason for the numbers which are not divisible.**
a) 3458 b) 56745 c) 3850 d) 6736 e) 6733 f) 3394
- Find the numbers which are divisible by 5 and 10. Write the reason for the numbers which are not divisible.**
a) 3568 b) 3540 c) 6585 d) 7550 e) 4235 f) 7200
g) 7865 h) 5880 i) 7885 j) 4440 k) 8198 l) 8645
- The numbers below are divisible by 5. Fill in the blanks with suitable digit.**
a) 786_ b) 560_ c) 785_ d) 555_ e) 586_ f) 786_ g) 584_ h) 100_
- Write any 5 numbers which are exactly divisible by 2 and 5.**
- Write any 5 numbers which are exactly divisible by 2, 5 and 10.**

Divisibility rules for 3, 4, 6, 8 and 9

Divisibility rule of 3:

Multiple of 3	Sum of the digits of the multiple	Digital root
3	3	3
6	6	6
12	$1+2=3$	3
15	$1+5=6$	6
39	$3+9=12$	$1+2=3$
147	$1+4+7=12$	$1+2=3$
342	$3+4+2=9$	9

Digital root:

The digital root of the number is the single digit that results from the continuous summation of the digits of the number.

Observe the digital root in the above table. What did you observe?

The digital roots of any multiple of 3 are _____, _____.

If the digital root of the numbers is 3 or 6 or 9, then the numbers are divisible by 3.

Ex-1: Does 345 is divisible by 3 or not?
Digital root of 345 is $3+4+5=12=1+2=3$
Hence it is multiple of 3
So 345 is divisible by 3

$$\begin{array}{r} 3) 345 \text{ (115)} \\ - 3 \\ \hline 04 \\ - 3 \\ \hline 15 \\ - 15 \\ \hline 0 \end{array}$$

Ex-2: Does 349 is divisible by 3 or not?
Digital root of 349 is $3+4+9=16=1+6=7$
Hence 349 is not multiple of 3
So 349 is not divisible by 3.

$$\begin{array}{r} 3) 349 \text{ (116)} \\ - 3 \\ \hline 04 \\ - 3 \\ \hline 19 \\ - 18 \\ \hline 1 \end{array}$$



You are divisible by 3

184



You are not divisible by 3

180

Divisibility rule of 9:

Bindu and **Ramu** filled the following table. You have to observe it.

Multiples of 9	Sum of the digits of the multiples	Digital root
9	9	9
18	$1+8=9$	9
27	$2+7=9$	9
99	$9+9=18$	$1+8=9$
135	$1+3+5=9$	9
162	$1+6+2=9$	9



What do you observe from the above table?

If the digital root of the number is 9, then the number is exactly divisible by 9.

Ex1: Take a number 531.

Digital root of 531 is $5 + 3 + 1 = 9$

What do you say about the number?

531 is divisible by 9 because the digital root of 531 is 9.

Ex2: Take a number 362.

Digital root of 362 is $3 + 6 + 2 = 11 = 1 + 1 = 2$

What do you say about the number 362?

362 is not divisible by 9. Because the digital root of 362 is not 9.

$$\begin{array}{r} 9) 531 \quad (59 \\ - 45 \\ \hline 81 \\ - 81 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 9) 362 \quad (40 \\ - 36 \\ \hline 2 \\ - 0 \\ \hline 2 \end{array}$$

Do these

- Circle the number which is exactly divisible by 3 and 9 and write correct reason.
a) 108 b) 116 c) 117 d) 127 e) 132 f) 822
g) 435 h) 783 i) 1107 j) 5535 k) 2343 l) 4563
- Write any 5 numbers which are exactly divisible by 3 and 9.

Divisibility rule of 4:-

Observe the last two digits [ones, tens] of the given number.

- 1) 624 2) 3232 3) 5840 4) 4556

There are 24, 32, 40 and 56 at the end of the numbers.

Hence all these numbers are multiples of 4.

24, 32, 40 and 56 are divisible by 4.

Divide 3232, 5840, 4,557 by 4.

What is the remainder? What do you observe?

3232 and 5840 are exactly divisible by 4.

4557 is not exactly divisible by 4.

$$\begin{array}{r} 4) 3232 \text{ (808)} \\ - 32 \\ \hline 03 \\ - 0 \\ \hline 32 \\ - 32 \\ \hline 0 \end{array}$$

If the last two digits [ones, tens] of a given number is exactly divisible by 4, the given number is also divisible by 4.



Do these

1) Circle the numbers which are divisible by 4.

Give the reason, if is not divisible by 4.

- a) 2436 b) 3840 c) 1235 d) 3636
- e) 6850 f) 5644 g) 8888 h) 6430

2) Write the missing number in the blank to make the number exactly divisible by 4.

- a) 323_ b) 304_ c) 58_6 d) 53__ e) 65__

Divisibility rule of 6:-

Bindu explained the divisibility rule for 6 to Baba, like this.

Write the multiples of 2: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24.....

Write the multiples of 3: 3, 6, 9, 12, 15, 18, 21, 24, 27.....

Write the multiples of 6: 6, 12, 18, 24, 30, 36.....

What did you observe?

All the multiples of 6 are the multiples of 2 and 3.

Example: Is 24 divisible by 6?

Ones place is 4 that is even.

24 is divisible by 2.

Digital root of 24 is $2 + 4 = 6$.

24 is divisible by 3.

So 24 is divisible by 6.

If a number which has 0, 2, 4, 6, 8 in its units place and the digital sum is 3, 6 and 9, then the number is also divisible by 6.

The numbers which are divisible by 2 and 3, are also divisible by 6.

Do these

1. Check whether the following numbers are divisible by 6 or not.

- 1) 210 2) 162 3) 625 4) 120 5) 156

2. Change the digits of the following numbers to make them divisible by 6.

- 1) 543 2) 231 3) 5463 4) 1002 5) 4815

Divisibility rule of 8 :-

Bindu : As 8 is the multiple of 4, is the divisibility rule for 4 also applicable for 8? Either right or wrong?

I will check whether the divisibility rule of 4 is applicable for 8 or not?

Observe the multiples of 4 and 8.

Multiples of 4: 4, 8, 12, 16, 20, 24, 28, 32

Multiples of 8: 8, 16, 24, 32, 40

So, all the multiples of 4 are not the multiples of 8.

∴ the divisibility rule for 4 is not applicable for 8.

Divide the last three digits of **29816** by 8

Divide 29816 by 8 .What did you observe?

In the above two conditions, the remainder is 0.

$$\begin{array}{r} 8) 816 \text{ (102)} \\ - 8 \\ \hline 01 \\ - 0 \\ \hline 16 \\ - 16 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 8) 29816 \text{ (3727)} \\ - 24 \\ \hline 58 \\ - 56 \\ \hline 21 \\ - 16 \\ \hline 56 \\ - 56 \\ \hline 0 \end{array}$$

Example: Divide the last three digits of 39328 by 8.

Divide 328 by 8.

(Observe the remainder of these two conditions. Thus, the remainders we get are zero.)

What did you say?

From the above two examples can you tell the divisibility rule for 8?

If the last three digits of a number are divisible by 8, then the entire number is divisible by 8



Do this

Find the following numbers which are divisible by 8.

- a) 2456 b) 3971 c) 824 d) 923 e) 2780 f) 93624 g) 76104

Exercise - 2

1) Circle the following numbers which are divisible by 2 (by using divisibility rule)

3624 3549 7864 8420 8500 8646 5007 7788

2) Find out which of the following numbers are divisible by 6.

1276 43218 71218 71826 4734 3743

3) The number 50 19 is exactly divisible by 9. Fill the with the correct number.

4) The number 4 468 is exactly divisible by 6. Fill the with the correct number.

5) Fill the blanks with suitable digits. So that it can be divisible by 2 and 10.

678_ 588_ 388_ 222_ 364_ 786_ 666_ 788_

6) Find the numbers which are divisible by 4 and 8.

2104 726352 1800 32256 52248 25608

7) Try whether the numbers are divisible by 2, 3, 4, 5, 6, 8, 9 and 10

- a) 333 b) 128 c) 225 d) 7535 e) 8289
f) 99483 g) 67704 h) 67713 i) 9410 j) 67722
k) 20704 l) 35932 m) 85446 n) 90990 o) 18540

8) Find the missing digit that would make each number divisible by the given number.

a) $395_$ by 10

b) $24305_$ by 9

c) $69839_$ by 3 and 9

d) $271_$ 8 by 6

e) $20710_$

f) $5027_$ 5 by 3 and 5

g) $145_$ 2 by 8

h) $92048_$ by 2

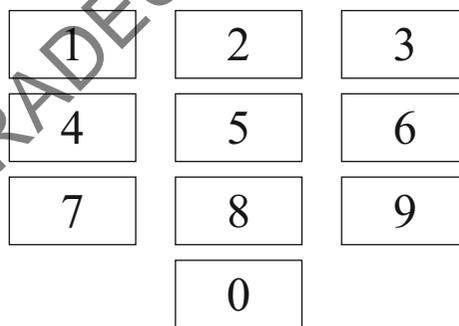
i) $23405_$ by 5

9. Find the smallest number that is to be added to 289279, so that it can be divisible by 8.

5.2:- Multiples:-

Activity

Take the cards having digits from 0 to 9, and flip and place on floor randomly. Now draw four big circles on board and name them as multiples of 4, multiples of 5, multiples of 6 and multiples of 7. A student has to take two cards at a time and form a 2-digit number, and check whether the number is multiple of 4 or 5 or 6 or 7 and then writes it in suitable circle.



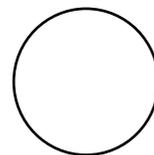
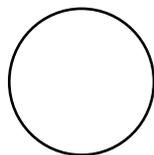
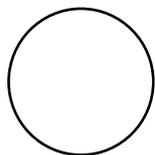
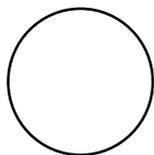
For example, if a student takes 3 and 2 cards, he may form 23 which is not multiple of any of the above, hence ask him to form 32 which is multiple of 2 and 4 then write in suitable circle. This can be executed as game, individual or group activity.

Multiples of 4

Multiples of 5

Multiples of 6

Multiples of 7



Do these

1) Write first ten multiples of the following.

a) 3

b) 5

c) 8

d) 9

e) 10

2) Find out the multiples of 2, 3, 5 from 1 to 20. Write separately.

3) Write down the first 10 multiples of 7.

4) Find out the multiples of 7,8,10 from the following numbers and write separately.

20, 14, 45, 24, 32, 35, 90, 8, 7, 10, 441, 385

5) Find out the numbers which are not the multiples of 3.

8 26 27 32 18 45
12 28 30 66 88 48

6) Write the odd multiples of 9 less than hundred.

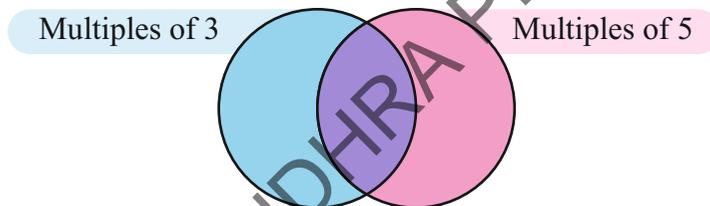


5.3:- Common Multiples:-

Write the multiples of 3 and 5 in the relevant circles .There may be a possibility of having some common multiples for 3 and 5. Write them in the common part.

Multiples of 3:

Multiples of 5:

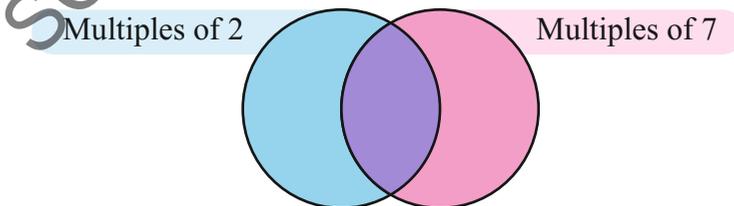


Common multiples of 3 and 5 are

Repeat the process using the numbers 2 and 7

Multiples of 2:

Multiples of 7:



Common multiples of 2 and 7:

Repeat the process by putting the multiples of 4, 6 and 5 in the given circles.

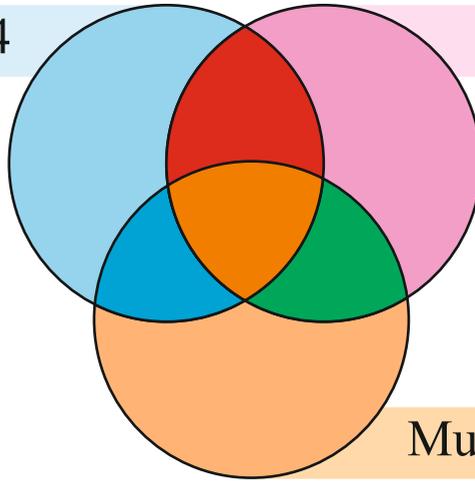
Multiples of 4:

Multiples of 6:

Multiples of 5:

Multiples of 4

Multiples of 6



Multiples of 5

What are the common multiples of 5 and 6?

You have write in _____ colour part.

What are the common multiples of 4 and 6?

You have written in _____ colour part.

What are the common multiples of 4, 5 and 6?

You have written in _____ colour part.

Example:

Write common multiples of 2 and 10.

Solution : Multiples of 2: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30...

Multiples of 10: 10, 20, 30, 40, 50, 60,.....

Common multiples of 2 and 10: 10, 20, 30, 40, 50,.....

Do these

Write the first 10 multiples of the following numbers and list the common multiples.

a) 2 and 4

b) 4 and 12

c) 6 and 8

d) 5 and 10

5.4:- Least common multiple (LCM):-

The smallest number of the common multiples of two or more numbers is called Least Common Multiple (LCM) of those numbers.

Example-1: The least common multiple (LCM) of 9 and 12 is

Multiples of 9 = 9, 18, 27, 36, 45, 54, 63, 72, 81, 90, 99, 108, ...

Multiples of 12 = 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, ...

Common multiples of 9 and 12 = 36, 72, 108, ...

Least common multiple (LCM) of 9 and 12 = 36

Example-2: Find the least common multiple (LCM) of 2, 4 and 6?

Solution: Multiples of 2 = 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, ...

Multiples of 4 = 4, 8, 12, 16, 20, 24, 28, 32, ...

Multiples of 6 = 6, 12, 18, 24, 30, ...

Common multiples of 2, 4 and 6 = 12, 24, ...

Least common multiple of (LCM) of 2, 4 and 6 = 12

Do this

Find the LCM for the following sets of numbers.

- 1) 12, 15 2) 16, 20 3) 8, 12, 20 4) 15, 20 5) 6, 9, 12

Try this

Find the LCM for the following pairs of numbers. What do you observe.

- 1) 15, 30 2) 4, 16 3) 5, 15 4) 6, 18



In a given pair of numbers, if one of them is multiple of other number then the biggest number is LCM of the numbers.

5.5:- Factors:-

Activity - 1

Fill the multiplication table.

X	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1												12		
2						12								
3				12										
4			12											
5														
6		12												
7														
8														
9														
10														
11														
12	12													
13														
14														

Observe the boxes in the above multiplication table.

1. Which numbers do we multiply to get 12?

$$1 \times 12 = 12$$

$$2 \times 6 = 12$$

$$3 \times 4 = 12$$

$$4 \times 3 = 12$$

$$6 \times 2 = 12$$

$$12 \times 1 = 12$$

But we know that

$$1 \times 12 = 12 \times 1$$

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

$$3 \times 4 = 4 \times 3$$

Therefore, we get $1 \times 12 = 12$

$$2 \times 6 = 12$$

$$3 \times 4 = 12$$

1, 2, 3, 4, 6 and 12 exactly divides 12.



2) Which numbers do we multiply to get 10?

$$\begin{array}{l} \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = 10 \\ \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = 10 \\ \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = 10 \\ \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = 10 \end{array}$$

Finally we get

$$\begin{array}{l} \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = 10 \\ \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = 10 \end{array}$$

 , , ,
are exactly divide 10.

3) Which numbers do we multiply to get 14?

$$\begin{array}{l} \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = 14 \\ \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = 14 \\ \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = 14 \\ \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = 14 \end{array}$$

Finally we get

$$\begin{array}{l} \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = 14 \\ \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = 14 \end{array}$$

 , , ,
are exactly divide 14.

When two or more numbers multiplied together, the number which we get as a result is called **product**.

The numbers which are multiplied together are called the factors of the product or the numbers which divide a given number exactly are called factors of the number.

From the above observations, we get

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

1, 2, 5, and 10 are factors of 10.

1, 2, 7 and 14 are factors of 14.

In the previous multiplication table, some numbers are shown in two boxes only. Identify the numbers and colour it.

$$1 \times 2 = 2 \times 1, 1 \times 3 = 3 \times 1, 1 \times 5 = 5 \times 1 \dots$$

Which numbers are shown twice?

What are the factors of those numbers?

Are they 1 and the number itself?

Those numbers are called prime numbers.

A number which has one and itself as its factors is called a Prime number.

What are the numbers which have more than 2 factors?

Those are called composite numbers.

Example:- 4, 6, 8, 9, 10, 12.....

A number which has more than two factors is called a composite number.

Example-1:- Find all the factors of 24 using all possible products.

Solution: $1 \times 24 = 24$

$$2 \times 12 = 24$$

$$3 \times 8 = 24$$

$$4 \times 6 = 24$$

Thus, all the factors of 24 are 1, 2, 3, 4, 6, 8, 12 and 24.

∴ 24 is a composite number.

Example-2:- Is 8 a factor of 2568?

We know that every number is divisible by its factors.

The remainder is zero, so 8 is a factor of 2568.

$$\begin{array}{r} 8 \overline{) 2568} \quad (321) \\ \underline{- 24} \\ 16 \\ \underline{- 16} \\ 08 \\ \underline{- 8} \\ 0 \end{array}$$

Do these

1) Find all the factors of the following numbers.

- a) 21 b) 38 c) 72 d) 96

2) Find out whether the first number is a factor of the second number.

- a) 14; 322 b) 26; 832 c) 35; 425 d) 56; 3500
e) 8; 48 f) 14; 37 g) 15; 75 h) 12; 72

3) What are the factors of 66?

4) Write all the even factors of 64.

5) List out the numbers, which are prime/composite below 20.



Prime Number	Composite Number

Fun activity:-



The number 1 has just one factor. It is neither prime nor composite.

Sieve of Eratosthenes:-

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

Step-1:- Cross out 1 as it is a neither prime nor composite.

Step-2:- Circle 2, and cross out all the remaining multiples of 2.

Step-3:- Circle 3, and cross out all the remaining multiples of 3.

Step-4:- Circle 5 and cross out all the remaining multiples of 5.

Step-5:- Circle 7 and cross out all the remaining multiples of 7.

Step-6:- Circle all the numbers which are not crossed.

Now, all the circled numbers are **Prime-numbers**.

And all the crossed numbers are **Composite numbers**.

Answer the following questions.

1) What are the prime numbers between 1 to 10?

2) What are the prime numbers between 10 to 20?



3) What are the prime numbers between 20 to 50?

4) How many prime numbers are there between 1 to 50?

5) What are the prime numbers between 50 to 100?

6) How many prime numbers are there between 50 to 100?

7) Do you observe any specialty in these prime numbers?
What is it?

8) Are the all prime numbers even or odd?

'2' is the only
even prime
number.



5.6:- Prime factorisation:-

Any composite number can be expressed as a product of some prime-numbers.

$$\begin{aligned}\text{Let's see, } 36 &= 2 \times 18 \\ &= 2 \times 2 \times 9 \\ &= 2 \times 2 \times 3 \times 3\end{aligned}$$

These are all prime numbers in above factorisation. Hence this factorisation is known as prime-factorisation.

Example:- $40 = 2 \times 20$

$$= 2 \times 2 \times 10$$

$$= 2 \times 2 \times 2 \times 5$$

Prime-factorisation by division method:-

Prime-factorisation for a given number can also be obtained by short-division method as shown below.

$$\begin{array}{r} 2 \overline{) 24} \\ \underline{2} \\ 2 \overline{) 12} \\ \underline{2} \\ 2 \overline{) 6} \\ \underline{2} \\ 3 \overline{) 3} \\ \underline{3} \\ 1 \end{array}$$

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

$$\begin{array}{r} 2 \overline{) 40} \\ \underline{2} \\ 2 \overline{) 20} \\ \underline{2} \\ 2 \overline{) 10} \\ \underline{2} \\ 5 \overline{) 5} \\ \underline{5} \\ 1 \end{array}$$

$$40 = 2 \times 2 \times 2 \times 5$$

$$\begin{array}{r} 2 \overline{) 36} \\ \underline{2} \\ 2 \overline{) 18} \\ \underline{2} \\ 3 \overline{) 9} \\ \underline{3} \\ 3 \overline{) 3} \\ \underline{3} \\ 1 \end{array}$$

$$36 = 2 \times 2 \times 3 \times 3$$

The steps to be followed in this method can be summarized as below:

Step-1:- Divide the given number by the smallest prime number that exactly divides it.

Step-2:- Divide the quotient further by a prime number that exactly divides it.

Step-3:- Continue the division till the remainder is not further divisible by any number.

Do these

1) Write the prime-factorisation for the following numbers.

- a) 52 b) 100 c) 88 d) 96 e) 90

2) The prime factorisation of 12×15 is _____

3) Match the following

- | | |
|---|--------|
| a) $2 \times 2 \times 2 \times 3 \times 3 \times 5$ | 1) 180 |
| b) $2 \times 2 \times 2 \times 3 \times 5 \times 5$ | 2) 360 |
| c) $2 \times 2 \times 3 \times 3 \times 5$ | 3) 900 |
| d) $2 \times 3 \times 3 \times 5 \times 5$ | 4) 600 |
| e) $2 \times 2 \times 3 \times 3 \times 5 \times 5$ | 5) 450 |

4) $5 \times 2 \times 3 \times 3$ is the prime factorisation of _____



5.7:- Common factors:-

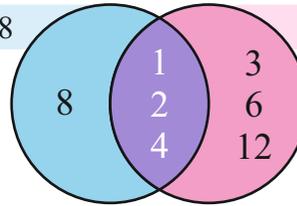
Ex-1: Find common factors for 8 and 12?

Factors of 8 = 1, 2, 4 and 8

Factors of 12 = 1, 2, 3, 4, 6 and 12

Common factors of 8 and 12 = 1, 2 and 4

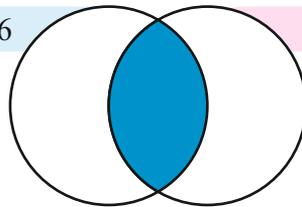
Factors of 8



Factors of 12

Ex-2: Write common factors of 6 and 14.

Factors of 6



Factors of 14



Factors common to two or more numbers are known as the common factors of those numbers.

Do this

Find the common factors of the following numbers and represent in the diagram.

a) 6 and 12

b) 12 and 20

c) 9 and 18

d) 11 and 22

5.8:- Highest common factor (HCF) or Greatest common divisor (GCD) :-

The highest common factor among the common factors of two or more numbers is called Highest common factor (HCF or GCD).

Example: Find the Highest Common Factor (HCF) for 24 and 36.

Factors of 24	1	2	3	4	6	8		12		24	
Factors of 36	1	2	3	4	6		9	12	18		36

Common factors of 24 and 36 = 1, 2, 3, 4, 6 and 12

Highest common factor (HCF) of 24 and 36 = 12

Do this

Find the HCF of the following pairs of numbers by writing common factors:-

- 1) 21 and 28 2) 34 and 20 3) 33 and 39
4) 16 and 36 5) 12 and 18 6) 80 and 100

Try this

Find the HCF for the following pair of numbers. What do you observe?

- 1) 4, 16 2) 4, 12 3) 5, 15 4) 14, 42

In any pair of numbers, if one of them is multiple of the other, the smallest number is the HCF of the pair of numbers.

There are other easy methods to find LCM and HCF even if we are given big numbers.

Prime-factorisation method to find LCM and HCF:-

Ex: Find LCM and HCF for 16 and 36 by prime-factorisation method.

$$\begin{array}{r|l} 2 & 16 \\ \hline 2 & 8 \\ \hline 2 & 4 \\ \hline & 2 \end{array}$$

$$\begin{array}{r|l} 2 & 36 \\ \hline 2 & 18 \\ \hline 3 & 9 \\ \hline & 3 \end{array}$$



Step-1: Write the prime-factorisation for the given numbers.

$$\text{Prime-factorisation of } 16 = 2 \times 2 \times 2 \times 2$$

$$\text{Prime-factorisation of } 36 = 2 \times 2 \times 3 \times 3$$

Step-2: Take common factors and multiply with the other factors then the product obtained is LCM of given numbers.

$$\text{Common factors} = 2 \times 2$$

$$\text{other factors} = 2 \times 2 \times 3 \times 3$$

$$\text{LCM} = 2 \times 2 \times 2 \times 2 \times 3 \times 3 = 144$$

Step-3: Take common factors and find product of them, which gives HCF of the given numbers. Common factors = 2×2

Therefore HCF = 4

Division method to find LCM:

Step-1: Divide the numbers by a common prime factor common to atleast two of the given numbers. Bring down the number such as it is not completely divisible by the prime-factor.

Step-2: Stop dividing when there is no further common factor except 1.

Step-3: Find the product of the numbers in the left column and the last remainders.

Example-1:- Find LCM for 16 and 36

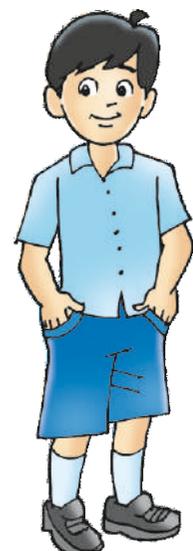
$$\begin{array}{l} 2 \mid 16, 36 \\ \hline 2 \mid 8, 18 \\ \hline 4, 9 \end{array}$$

LCM of 16 and 36 = $2 \times 2 \times 4 \times 9 = 144$

Example-2:- Find LCM for 32, 24 and 48

$$\begin{array}{l} 2 \mid 32, 24, 48 \\ \hline 2 \mid 16, 12, 24 \\ \hline 2 \mid 8, 6, 12 \\ \hline 2 \mid 4, 3, 6 \\ \hline 3 \mid 2, 3, 3 \\ \hline 2 \mid 2, 1, 1 \\ \hline 1, 1, 1 \end{array}$$

LCM of 32, 24 and 48 = $2 \times 2 \times 2 \times 2 \times 3 \times 2 = 96$.



Find HCF by common division method:-

Step1: Divide the numbers by common factors of all the given numbers.

Step2: Stop dividing when there are no more common factors except 1.

Step3: Find the product of common factors.

Example: Find HCF of 16,36

$$\text{Common factors } \left\{ \begin{array}{l} 2 \mid 16, 36 \\ 2 \mid 8, 18 \end{array} \right.$$

4, 9..... Do not have common factors.

2×2 are common factors.

$$\text{H.C.F} = 2 \times 2 = 4$$

Do these

1) Find LCM and HCF by prime factorisation method for the following.

a)15, 48 b) 18, 42, 48 c)15, 25, 30 d) 10, 15, 25 e)15, 18, 36, 20

2) Find LCM and HCF by division method.

a)16,28,36 b)12,18,42 c)30,75,90 d)24,32,48 e)12,15,18

Activity

Fill the table and observe it.

S.No	First number	Second number	Product of two numbers	HCF	LCM	HCF X LCM
1	9	12	108	3	36	
2	20	300		5	60	
3	18	15				270
4	8	12				

Do you have any observation?

Let us learn more properties in the next class.

5.9:- Real-life problems on LCM and HCF:-

Notes:-

- 1) LCM of given numbers is the smallest number which is exactly divisible by the numbers.
- 2) HCF of given numbers is the greatest number which divides exactly the given numbers.

Example-1: What is the least number of students required to stand in rows equally if number of the rows are either 2, 3, 4, 6, or 8?

Solution:- To find the required least number of students, we need to find the LCM for 2, 3, 4, 6 and 8.

$$\begin{array}{r} 2 \overline{) 2, 3, 4, 6, 8} \\ 2 \overline{) 1, 3, 2, 3, 4} \\ 3 \overline{) 1, 3, 1, 3, 2} \\ 1, 1, 1, 1, 2 \end{array}$$

$$\text{LCM of } 2, 3, 4, 6 \text{ and } 8 = 2 \times 2 \times 3 \times 2 = 24$$

The least number of students who can be stood in 2, 3, 4, 6, 8 rows equally = 24

Example-2:- To what least number of students, 5 students to be added to make three teams containing 12, 15 or 18 each?

Solution: We need to find the least number which is divisible by 12, 15 and 18.

$$\begin{array}{r} 3 \overline{) 12, 15, 18} \\ 2 \overline{) 4, 5, 6} \\ 2, 5, 3 \end{array}$$

$$\text{LCM of } 12, 15, 18 = 2 \times 2 \times 3 \times 3 \times 5 = 180$$

The required number of students to make 3 teams = 180

Hence the required number is formed by adding 5,

$$\therefore \text{The least number} = 180 - 5 = 175$$

Do you know?

- ♦ 1 is factor for every number.
- ♦ Every number is factor to itself.



Example-3:- What is the capacity of the largest vessel which can measure the oil from three vessels of 32 litres, 24 litres and 48 litres completely?



Solution: To find out the largest vessel, we find HCF of 32, 24 and 48.

$$\begin{array}{r}
 2 \left| \begin{array}{l} 32, 24, 48 \\ \hline 16, 12, 24 \\ \hline 8, 6, 12 \\ \hline 4, 3, 6 \end{array} \right. \\
 \end{array}$$

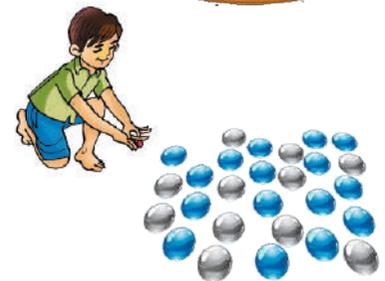
$$\text{HCF} = 2 \times 2 \times 2 = 8$$

The capacity of the required largest vessel = 8 litres

Exercise - 3

Solve the following word-problems:-

- 1) There are some fruits in a basket. If we arrange 4 or 6 or 8 or 10 fruits in a pile, no fruits are left in the basket. What is the minimum number of fruits in the basket?
- 2) Ramu has 16 blue marbles and 12 white ones. If he wants to arrange them in identical groups without leaving any marbles, what is the maximum number in each group Ramu can make?
- 3) Two Neon lights are turned on at the same time. One blinks for every 4 seconds and other blinks for every 6 seconds. In 60 seconds how many times will they blink at a time?

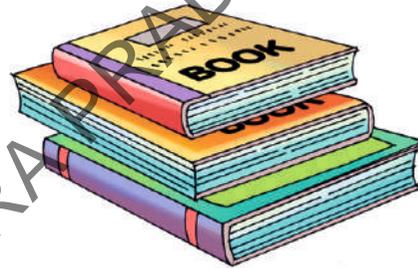


- 4) There are 40 girls and 32 boys, who want to participate in state-level games competition. If each team must have the same number of girls and the same number of boys.

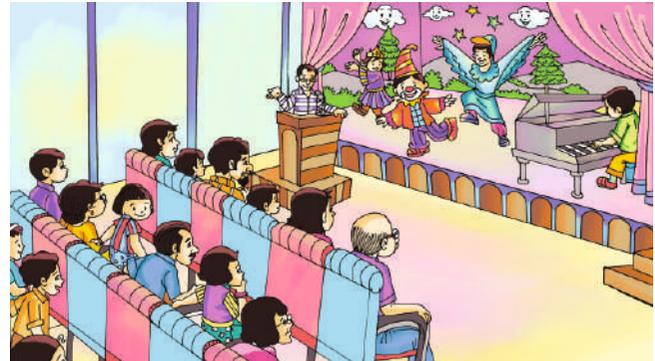
- i) What is the maximum number in each team that can participate in state-level games?
- ii) How many boys and girls will be on each team?



- 5) Find the least number of sheets of paper required to make notebooks containing 32 sheets or 40 sheets or 48 sheets without a single sheet leaving behind.



- 6) What is the least number of chairs needed for an auditorium so that they can be arranged either 27 in a row or 33 in a row?



**6.1:- Point:-**

(1) Observe the following pictures:



A distant star



Tip of a pencil



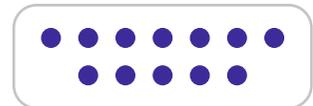
Dots in a Rangoli



Vertex of a cone

(2) Take a pencil and mark some dots in your notebook.

(3) Take a paper and mark three dots on it with a marker pen, a sketch pen and a pencil. Observe that the dot will become smaller and almost invisible tiny dot.



What do you observe from all the above examples?

All these examples give the idea of a point.



A point is an exact location in space. It has no length or width and thickness.

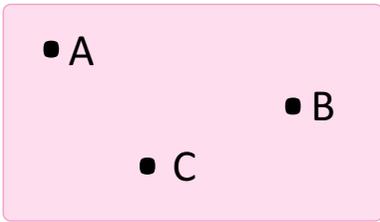
We represent a point by '.' (as small as possible dot)



How do we denote these points?

A point is denoted by capital letters of English alphabet like A, B, C,...

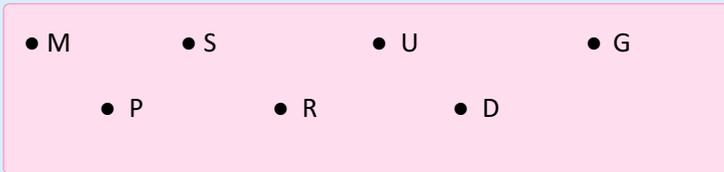




In the adjacent figure A, B and C are three points. They are read as point A, point B and point C.

Do these

(1) Read the following points.



(2) Write any 5 distinct points from the above.

(3) Note down any 3 points in your note book and name them.

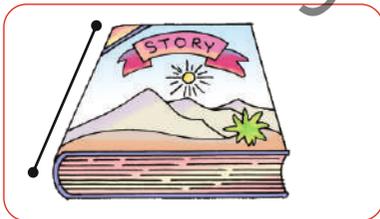
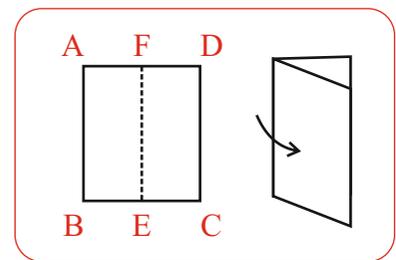


6.2:- Line segment:-

Activity - 1

Take a paper and fold it as shown in the figure.

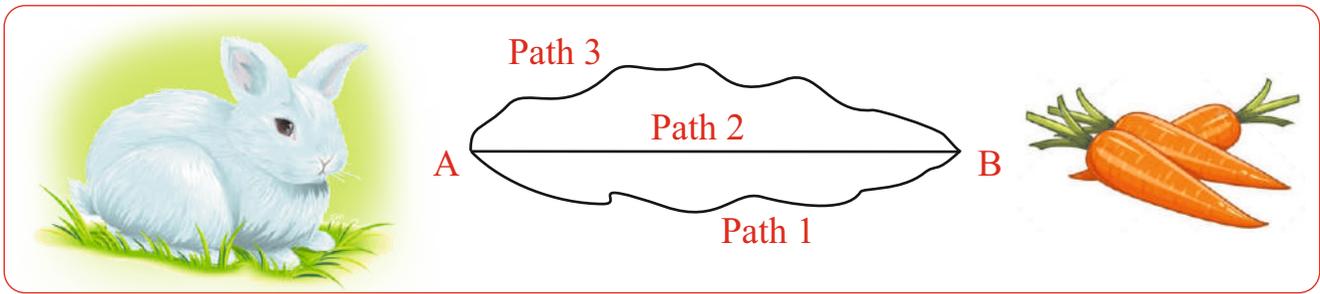
Look at the folded edge of this paper. It gives us an idea of what a line segment is. The crease left on the sheet represents a line segment. It has two end points. From the adjacent figure, the two end points are E and F.



Take your notebook and draw a line along its edge with a pencil on a sheet of paper and observe it. It is a representation of a line segment. It has two end points, fixed length but no thickness.

Activity - 2

Observe the figure given below which is the shortest path that can be followed by the rabbit to eat the carrot.



As you can see path 2 represents a line segment with rabbit at one end point and carrot at the other end.



What do you observe from all the above?

In every case, the shortest path between two points represents a line segment. It has definite length but no breadth or thickness.



Then how can a line segment be denoted?

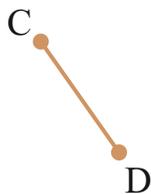
We denote the line segment with its two end points.



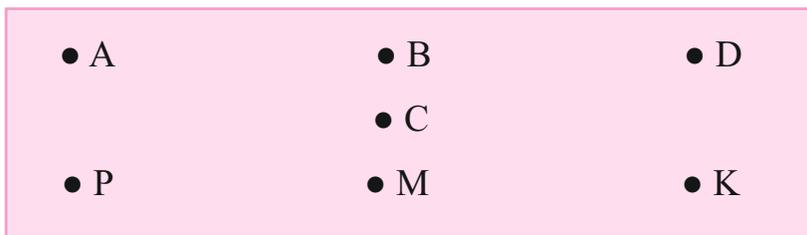
From the adjacent figure the line segment is denoted as \overline{AB} or \overline{BA} and read as line segment AB or BA.

Do this

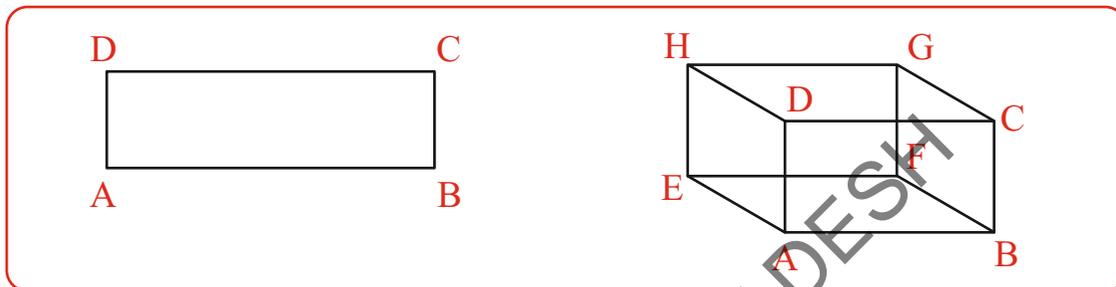
(1) Read the following line segments



(2) Draw some line segments by joining following points and name them.



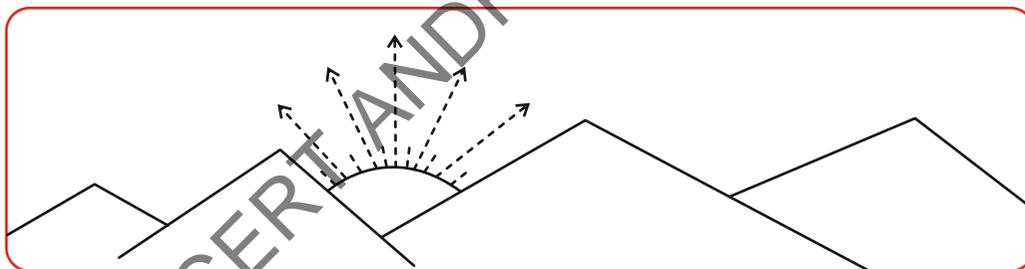
(3) Find the line segments in the figures given below



6.3:- Ray:-

Activity - 3

Observe the picture given below.



Pratibha : What do you observe from the above picture ?

Pragna : Sun, Rays and Mountains.

Pratibha : Where do the rays are coming from ?

Pragna : The rays are coming from the Sun.

Pratibha : Where do the Sun rays travel up to ?

Pragna : The Sun rays has no end.

Pratibha : What is a ray?

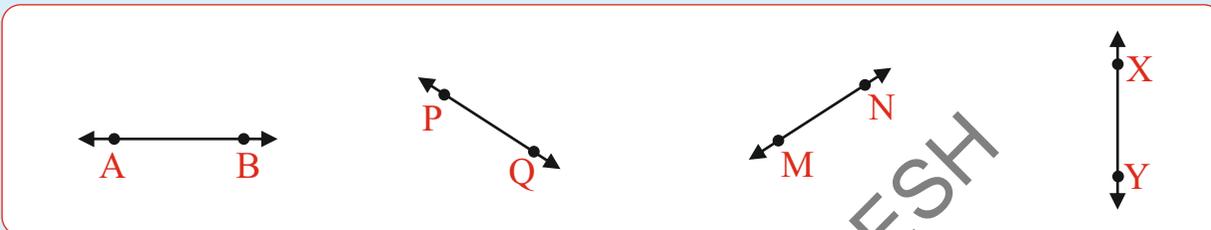
Pragna : We can define a ray like this.

A line has no end points and no width. We can't measure its length. It is denoted by any two points on it. If P, Q are two points on the line, it is denoted as \overleftrightarrow{PQ} or \overleftrightarrow{QP} .



Do this

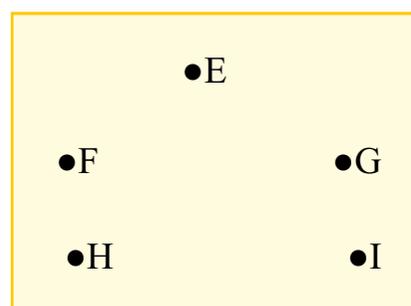
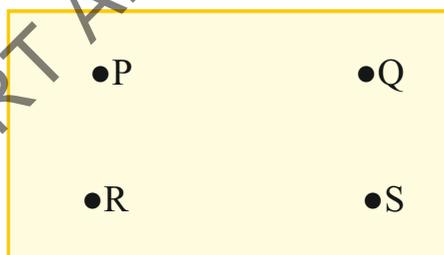
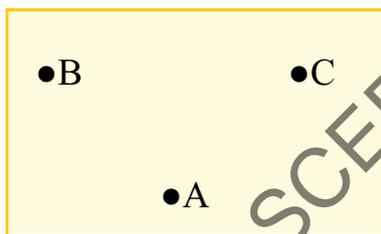
(1) Read the following lines.



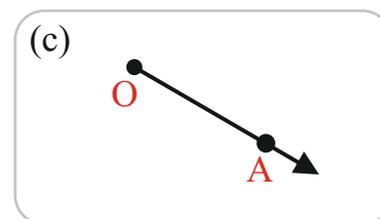
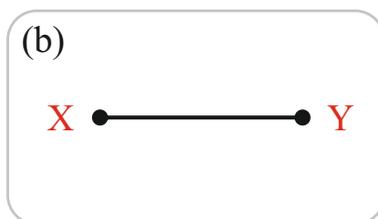
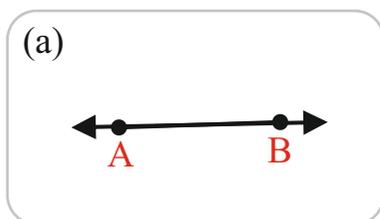
(2) Take any two points and draw a line.

Exercise - I

- 1) Take any six points on a paper and name them.
- 2) Join the points given below. Name the line segments so formed in the figures.



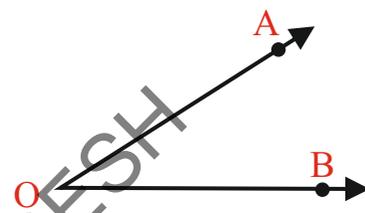
3) Classify the following as ray, line and line segment. Also name them.



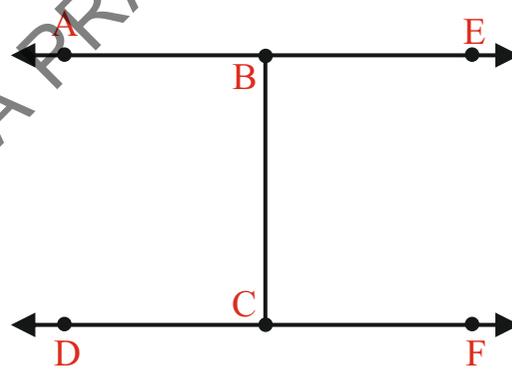
4) Check whether the statements are True (T) or False (F). If it is false, give the reason.

- a) A ray has a definite length. ()
- b) A ray has one end point. ()
- c) A Line segment has a fixed length. ()
- d) A Line segment has no end points. ()
- e) A Line has no end points. ()

5) Represent the rays from the figure given below.



6) Find rays, lines and line segments from the figure given below.



7) How many straight lines can be drawn through?
a) One point b) Two distinct points

8) Observe the following figure and answer the questions given below.



- a) Write any three points.
- b) Write any Two rays.
- c) Write any five line segments.



6.5:- Types of Angles:-

Angle

Observe the pictures given below.



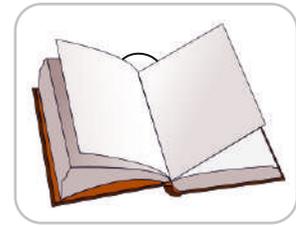
Open door



Hanger



Clock

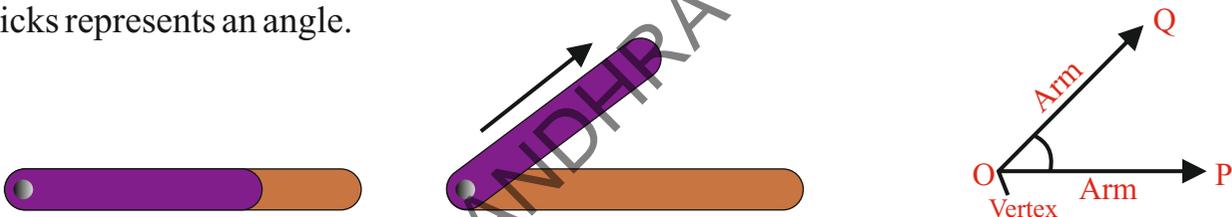


Partially Opened book

Observe the regions marked in the above figures. The region between two rays (clock hands) line segments (edges of hanger, door and papers of the book) have a common end.

Activity - 1

Take two ice-cream sticks and a drawing pin. Use the pin to bind the sticks at one end. Care should be taken that the binding is loose enough to allow movement of sticks. Keep the position of one stick constant and move the other stick. The formed region between the sticks represents an angle.

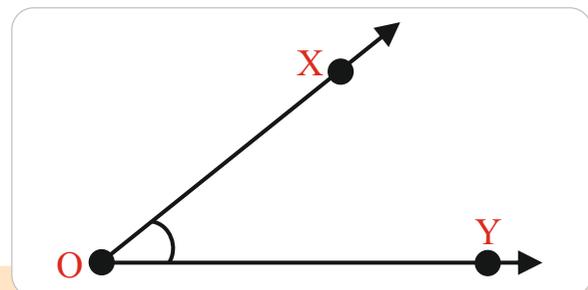


- Draw OP and OQ rays. With a common end point at 'O'.
- There formed an angle. It is denoted as $\angle QOP$ or $\angle POQ$ or $\angle O$.

An angle is formed when two rays meet at a common end point. The rays are the arms of an angle. The point at which the two rays meet is called vertex. The symbol of angle is ' \angle '.

Example: Observe the adjacent figure.

- Vertex is 'O'
- Arms are \overrightarrow{OX} and \overrightarrow{OY}
- Angle is $\angle XOY$ or $\angle O$ or $\angle YOX$



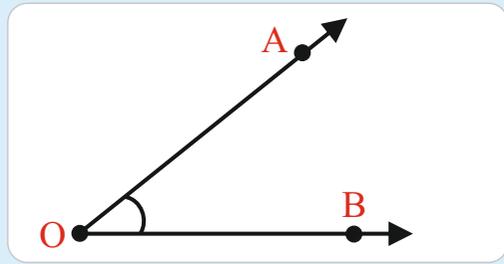
Note:

To show the formation of an angle in a concrete way the above activity is taken up.

Do these

1) Observe the adjacent figure and fill in the blanks.

- Vertex is
- Arms are.....
- Angle is



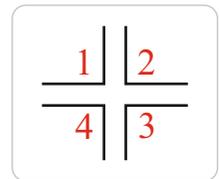
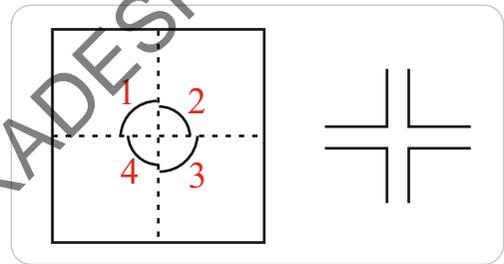
2) Observe the various items in your classroom and write the things where angles occur.

Right Angle

Activity - 1

Take a square sheet of paper. Fold it vertically and horizontally as shown in the figure. Unfold it and look at it. Observe the point where the two creases meet. Mark the angles.

If we draw the angles, they look like as shown beside.

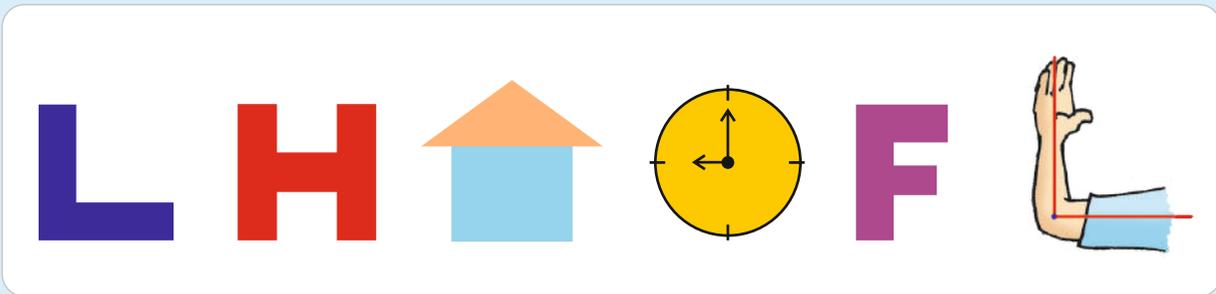


Are all these angles equal ?

All these angles are equal. And these angles are called right angles. It is denoted with '∟'.

Do this

(1) Mark the right angles in the given pictures.



Acute and obtuse angles

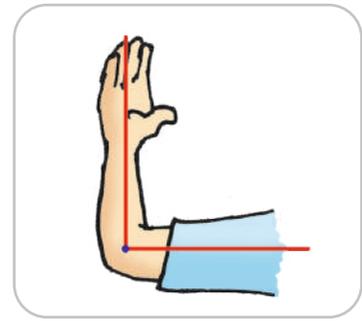
Activity - 1

Observe the adjacent figure.

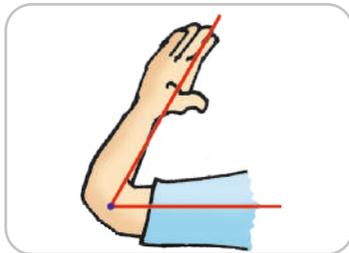
The angle formed at elbow is a right angle.

Observe the figures given below. The angle in picture no. ii is less than right angle.

The angle in picture no.iii is greater than right angle.

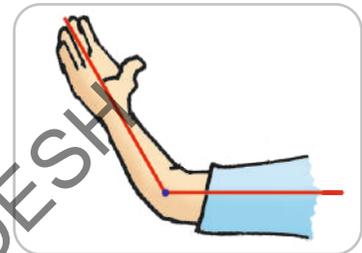


(Pic. i)



(Pic.ii)

What type of angles these are called ?



(Pic. iii)

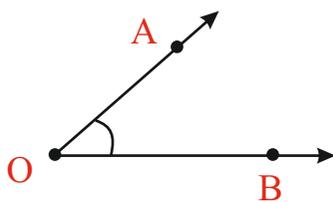
The angle less than right angle is called 'acute angle'.

The angle greater than right angle is called 'obtuse angle'.

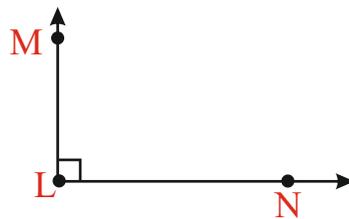
Do this

Observe the angles given below and classify them as acute, obtuse and right angles.

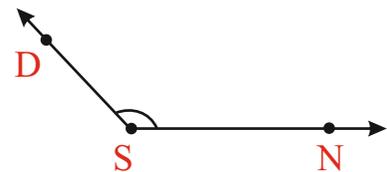
(a)



(b)



(c)

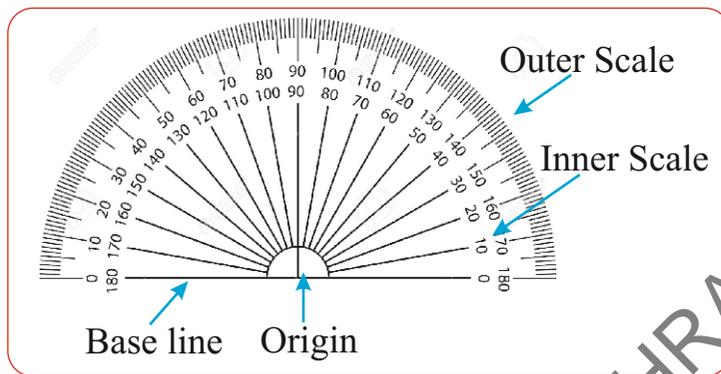
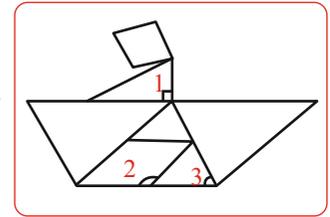


6.6: Measuring an angle:

Activity - 1

Observe the angles in the adjacent figure and write in the table.

S.No	Angle	Type of angle
1	Angle 1	
2	Angle 2	
3	Angle 3	

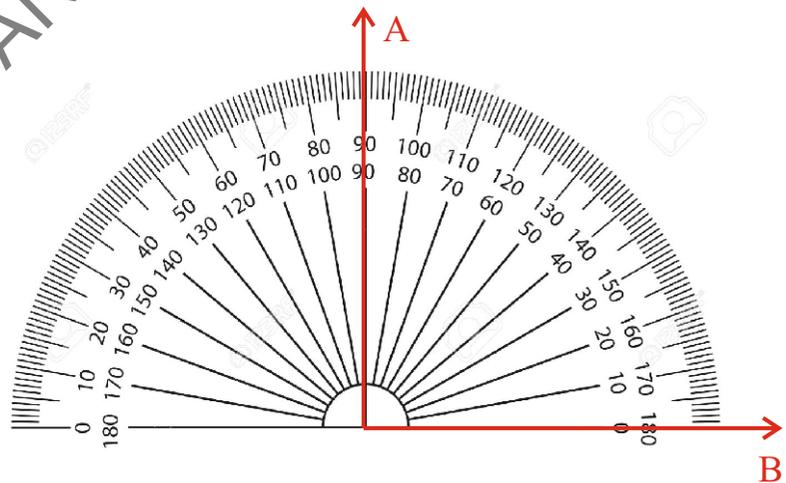
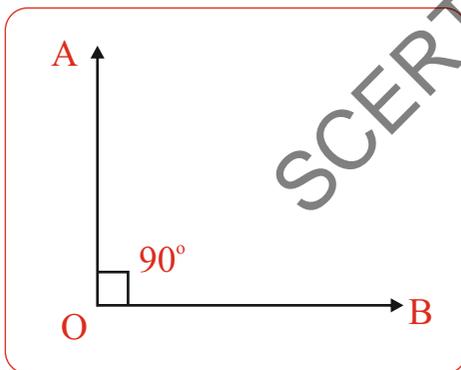


How are these angles measured?



Angles are measured in 'degrees'. To measure an angle we use an instrument called 'Protractor'. It has a baseline, origin and set of two scales.

Activity - 2

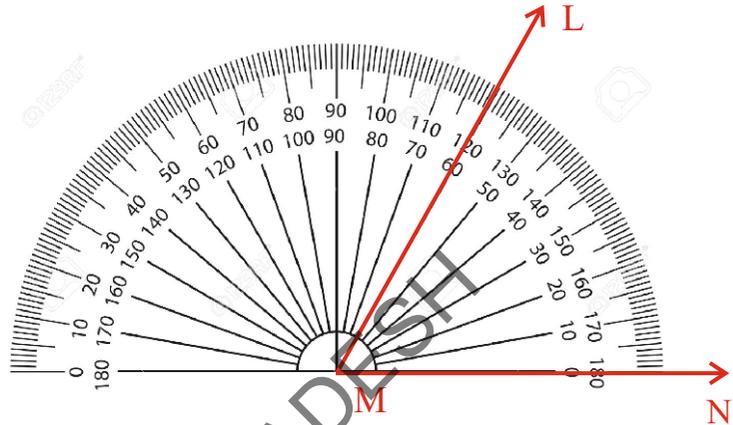
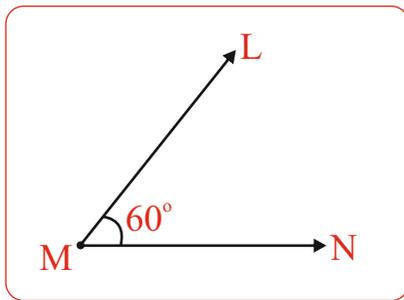


- ❖ Place the origin of the protractor on the vertex of the angle.
- ❖ Align the base line of the protractor with one arm of an angle without shifting the origin of the protractor from the vertex of the angle.

- ❖ Adjust for the zero of the protractor on the base line that aligns with the arm of the angle
- ❖ Read the angle from that side
- ❖ Angle AOB is 90° .

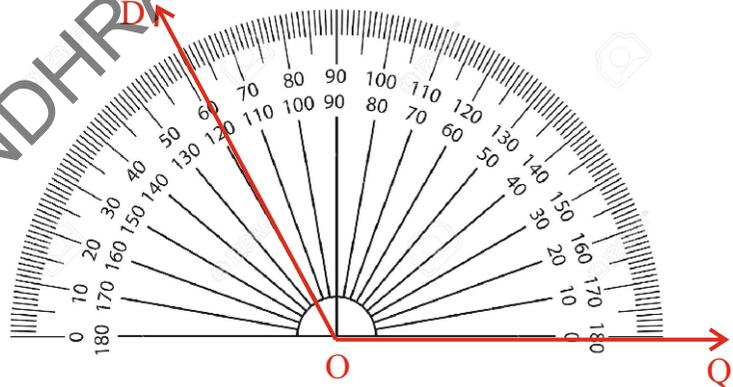
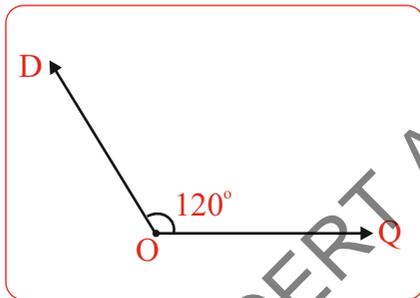
Measure of a right angle is 90° .

(2)



If the measure is less than 90 degrees, it is an acute angle.

(3)



If the measure is more than 90° and less than 180° , it is an obtuse angle.

Do this

Classify the angles given below.

25° , 30° , 45° , 120° , 150° , 90° , 160° , 95° , 100° , 60° , 80° , 75° , 110°

Acute angles: _____

Right angle: _____

Obtuse angles: _____

PROJECT WORK

Write the word 'MATH' using the line segments and write the number of right angles, number of acute angles and number of obtuse angles formed in these letters.

LETTER	NO. OF RIGHT ANGLES	NO. OF ACUTE ANGLES	NO. OF OBTUSE ANGLES
M			
A			
T			
H			

Exercise - 2



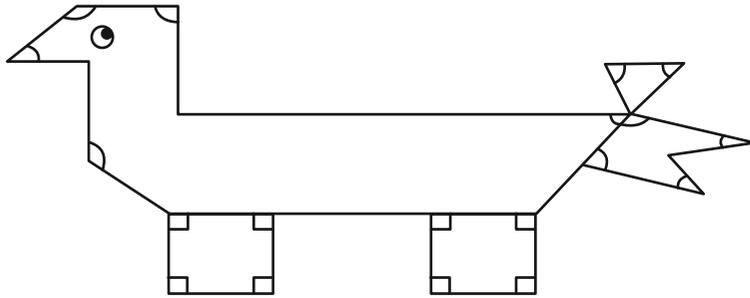
(1) Observe the following angles and write them.

(i)	(ii)	(iii)
 _____	 _____	 _____

(2) Observe the following. Name the type of angle.

(1)	(2)	(3)
 _____	 _____	 _____

- (3) Observe the picture given below. Count the number of acute angles, obtuse angles and right angles.



No. of Right angles _____

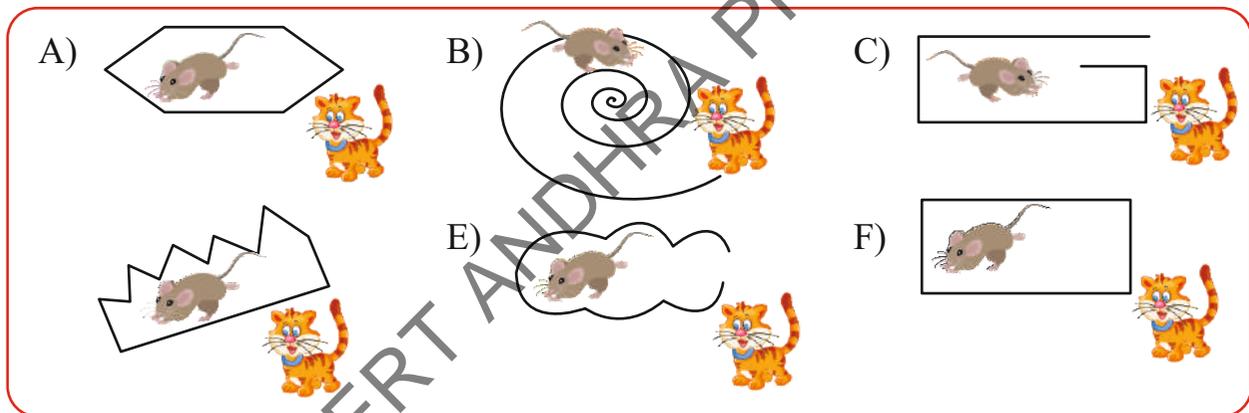
No. of Acute angles _____

No. of Obtuse angles _____

6.7:- Open and closed figures:-

Activity - 1

Observe the figures given below.



Children!

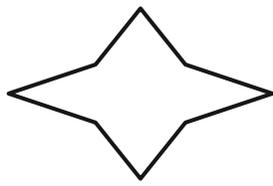
- (1) In which figures, can the cat catch the rat ?
- (2) In which figures, can the cat not catch the rat? Why ?

The figures, which are not closed by line segments or curves are called "Open figures".



The figures, which are closed by line segments or curves are called "Closed figures".

Examples :



,



Closed figures



,



Open figures

Do this

Observe the figures given below. Write 'O' under the open figure and 'C' for closed figure.



Activity - 2



AB =

BC =

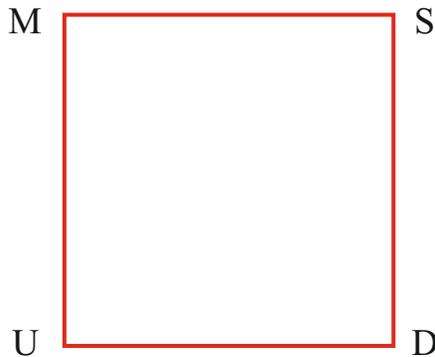
CD =

DA =

- ❖ Find the lengths of \overline{AB} , \overline{BC} , \overline{CD} , \overline{DA} .
- ❖ Observe the lengths of \overline{AB} and \overline{CD} .
- ❖ Observe the lengths of \overline{BC} and \overline{DA} .
- ❖ Measure the $\angle A$, $\angle B$, $\angle C$ and $\angle D$.
- ❖ What do you observe?

The closed figure with equal opposite sides and four right angles is called rectangle.

Activity - 3



MS =

SD =

DU =

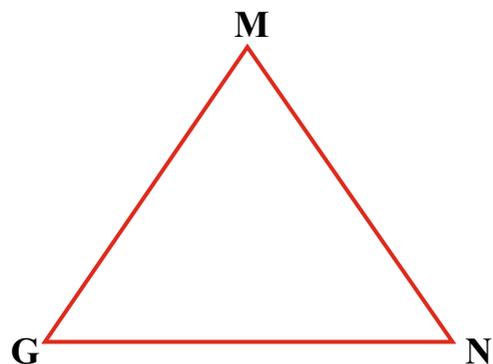
UM =

- ❖ Find the lengths of the all sides of the above figure (i.e. \overline{DU} , \overline{SD} , \overline{MS} , \overline{UM})
- ❖ Find the all the angles in this figure
- ❖ What do you observe ?

The closed figure with four equal sides and four right angles is called square.

Activity - 4

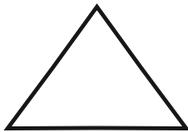
- ❖ How many sides are there in this figure ?
- ❖ How many angles are there in this figure ?
- ❖ Do you know the name of this closed figure ?



The closed figure with three sides, is called “triangle.” It has three angles.

Exercise - 3

(1) State what figures are open and which are closed .

(1)  _____ _____	(2)  _____ _____	(3)  _____ _____
(4)  _____ _____	(5)  _____ _____	(6)  _____ _____

(2) Draw three simple closed figures by using straight lines only.

(3) Draw three simple closed figures by using both straight lines and curved lines.

(4) What is angle in a rectangle ?

(5) Square is a special case of rectangle. What is its specialty in terms of sides?

(6) Why there are four angles in a rectangle?

(7) What are the properties of a rectangle?

(8) Give some examples of articles in square shape.

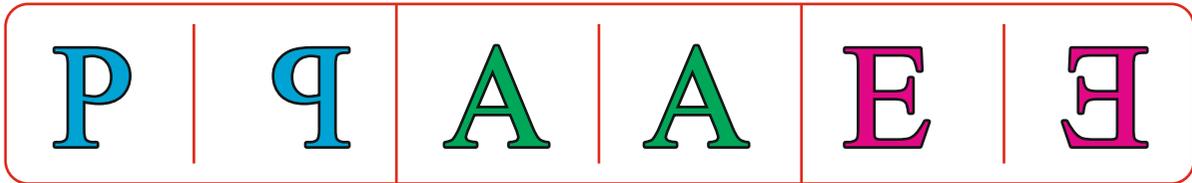
6.8:- Symmetry:-

Rani was getting ready to go to school. She noticed the word 'FIRST' written on the shirt of her uniform.



The appearance of the word 'FIRST' written on her shirt in the mirror made her confused. Only letters I and T looked same in the mirror.

She started playing with the mirror. She kept the mirror along P, A and E letters and saw their reflection as shown here under.



- 1) Which letters have same images?
- 2) Which letters have different images?

Do this

Here are some letters. Tick the letters which look different in the mirror.



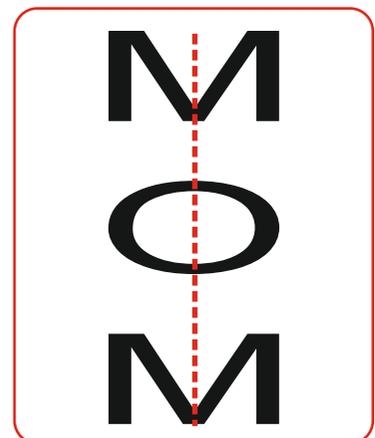
Think & Discuss:

Can you think of more such alphabet will remain same in mirror images?

Activity - 6

Write some letters which have the same mirror image on a paper as shown in the adjacent figure. Then fold the paper along the dotted lines as shown in the figure.

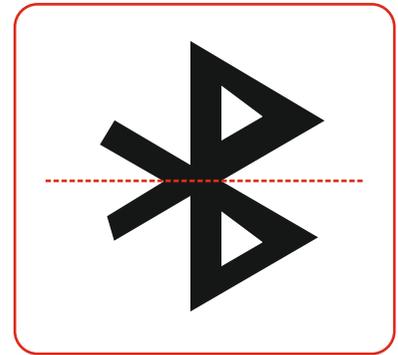
When we fold the paper along the dotted line, we observe that half of the letter on one side of the crease, completely covered the other half side of the crease.



Activity - 7

Look at the adjacent figure. What do you observe ?

We observe that, half of the figure on one side of the dotted line, completely covers the other half side when it folded along the dotted lines. Such figure is called symmetrical figure. The folded line is called the line of symmetry.



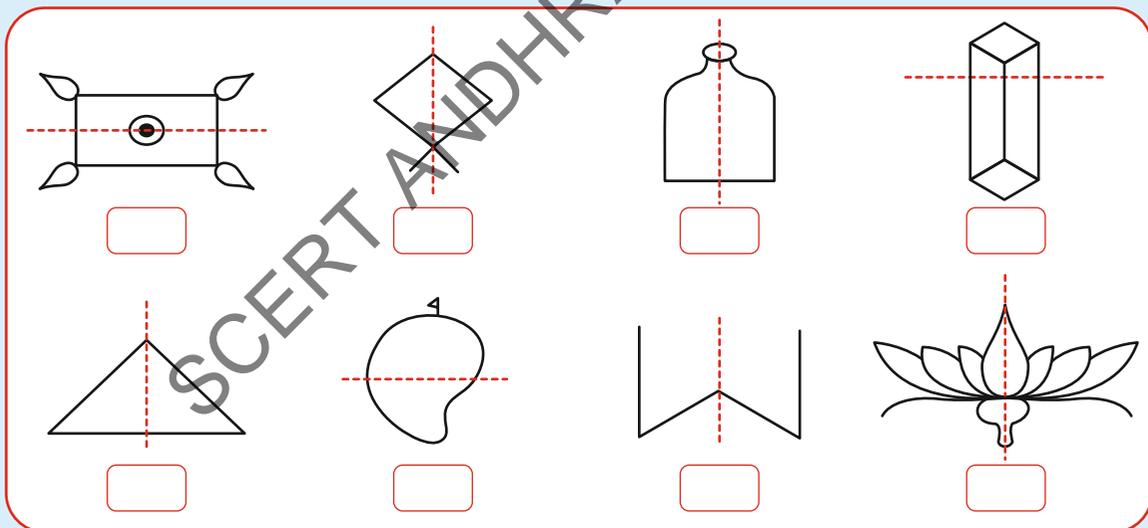
Can you find out any other figure or any alphabet or a word you know that holds the above property?



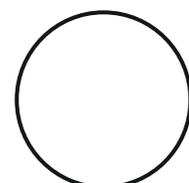
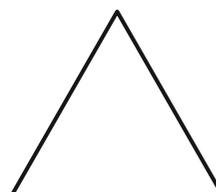
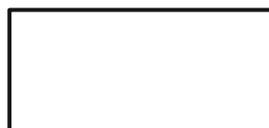
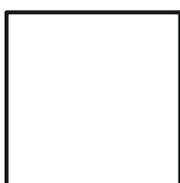
B, C, K are some letters

Do this

(1) Put (✓) mark to the picture which have line of symmetry.



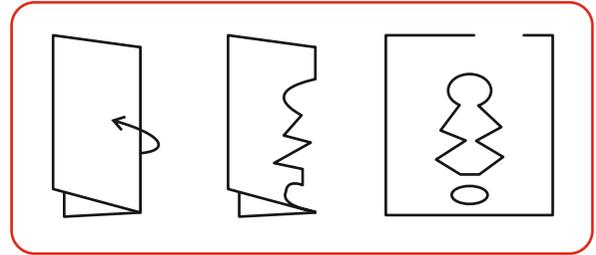
(2) Draw possible number of symmetrical lines for the given figures.



Activity - 8

Symmetrical figures by cutting a paper...

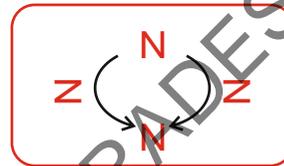
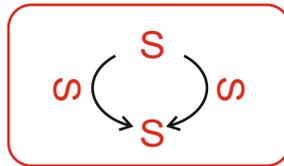
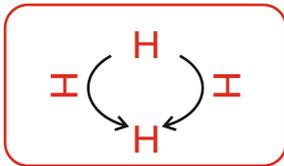
Take a paper and fold it. Cut it as shown in the figure. Open it and see the design. Will one half cover the other?



Half a turn or Less

Activity - 9

Observe the Pictures given below.

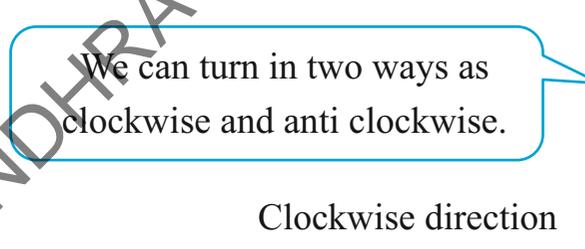


Each of these letters H , S, N look the same if you rotate them upside and down.



How did you turn it?

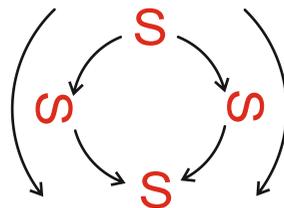
Anti clockwise direction



We can turn in two ways as clockwise and anti clockwise.

Clockwise direction

After rotation if an object looks exactly the same, we say that it has a rotation symmetry.



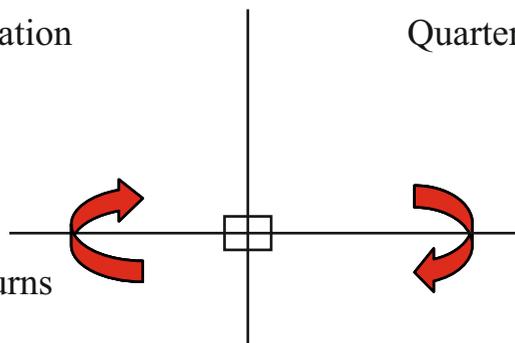
What is a half turn?

Full rotation

Quarter rotation



3 quarter turns



$\frac{1}{2}$ turn



A half turn means rotation by two quarter turn or 180° .

Complete the following table

Picture	Draw how it will look after a half turn (1/2)
	
	
	
	
	



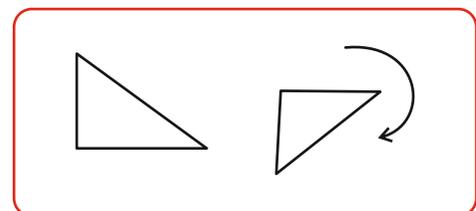
What do you observe from the above table?



After half turn some look same; some do not.

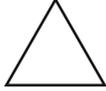
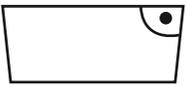
Turn a quarter (1/4)

Look at the adjacent figure. It is turned half of a $\frac{1}{2}$ turn. We say that it is turned a quarter ($\frac{1}{4}$) turn.



Do this

Complete the following table.

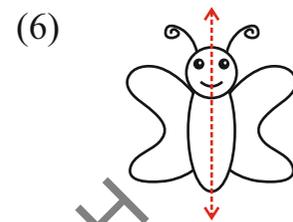
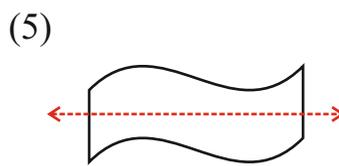
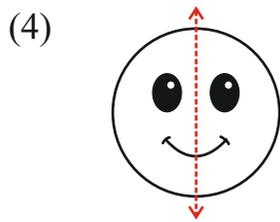
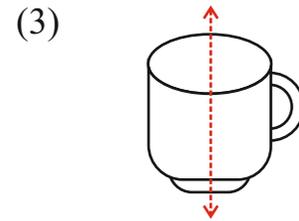
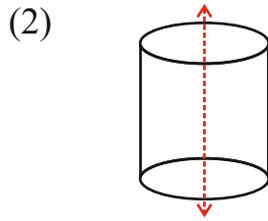
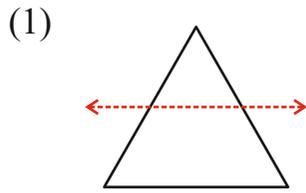
Shape	$\frac{1}{4}$ turn	$\frac{1}{2}$ turn
		
		
		
		
		
		
		

Exercise - 4

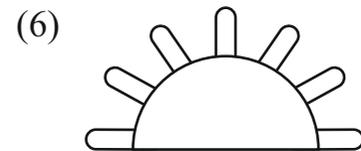
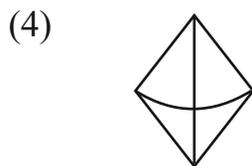
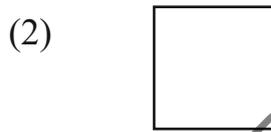
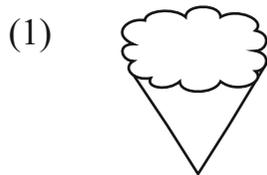
(1) Match each letter with its mirror image. The dotted line with every letter shows the mirror.

	Letter	Image
(i)	T	J
(ii)	C	M
(iii)	L	U
(iv)	M	T
(v)	U	C

(2) Check whether the dotted line represents the line of symmetry or not and put a tick mark under the figure with line of symmetry.



(3) Draw possible lines of symmetry for the figures given below, wherever possible.



(4) Complete the following table

Picture	$\frac{1}{4}$ (Quarter) turn	$\frac{1}{2}$ (Half) turn

6.9:- Picture Pattern:-

Activity - 1

Observe the following pictures.



Saree borders



Carpets designs



Floor designs



Quilts designs



What do you observe from all the above pictures ?

What is the name of shapes which are repeated in a sequence ?

In all the shapes from are repeated in a sequence (series)

Patterns.



A pattern is a series or sequence of repeated shapes and figures. Patterns enhance beauty. All patterns are formed by repeating certain shapes.



Try these

1. Arrange some patterns using ○, △, □ and ▭.

2. What should come next?

(a) _____

(b) _____

(c) _____

(d) _____

(e) _____

6.10:- Perimeter and area:-

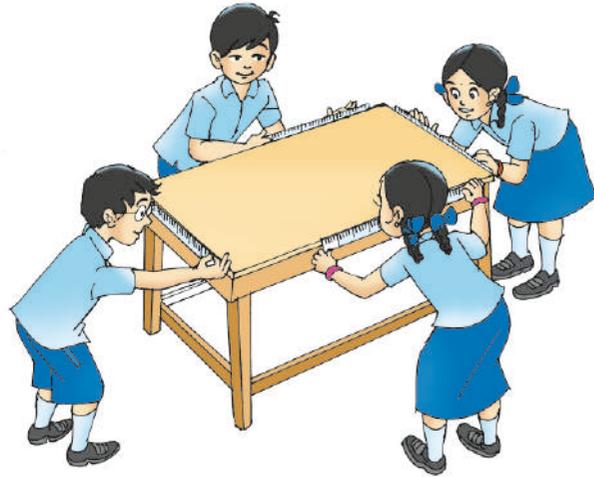
Perimeter

Activity - 1

Children, measure four sides of the table.

Use scale or tape to measure.

Write your observation.



Length of first side measured by the first student _____ cms

Length of second side measured by the second student _____ cms

Length of third side measured by the third student _____ cms

Length of fourth side measured by fourth student _____ cms

Total length of the four sides : _____ cms

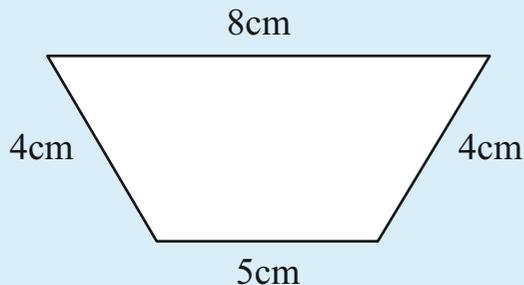
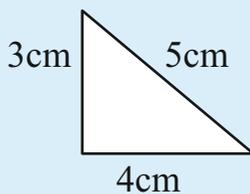
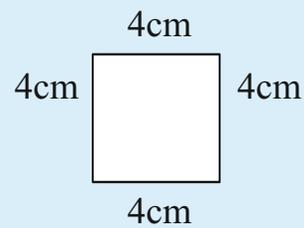
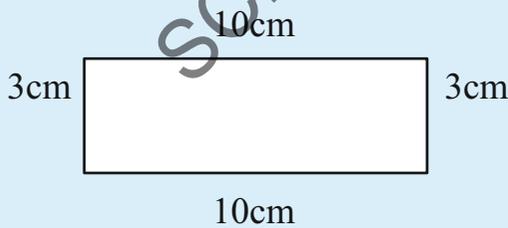
We call it as 'Perimeter'

What is it called the total length of the boundary?



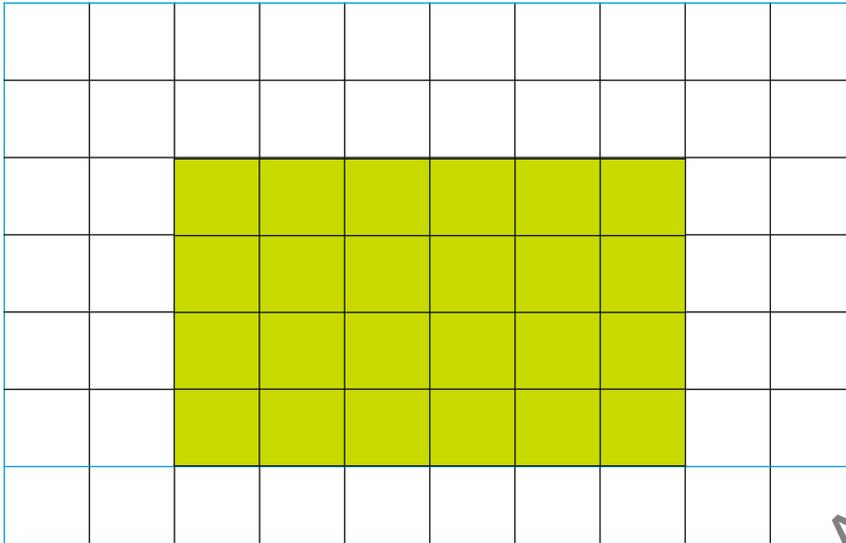
Do this

(1) Find the perimeter of the following .



Activity - 2

(Using a grid paper find the perimeter of the rectangle... Shaded)



Perimeter refers to the total length of the boundary.



$$\begin{aligned}\text{Perimeter of a rectangle} &= 6 + 4 + 6 + 4 \\ &= \text{Length} + \text{Breadth} + \text{Length} + \text{Breadth} \\ &= 2 \text{ Lengths} + 2 \text{ Breadths}\end{aligned}$$

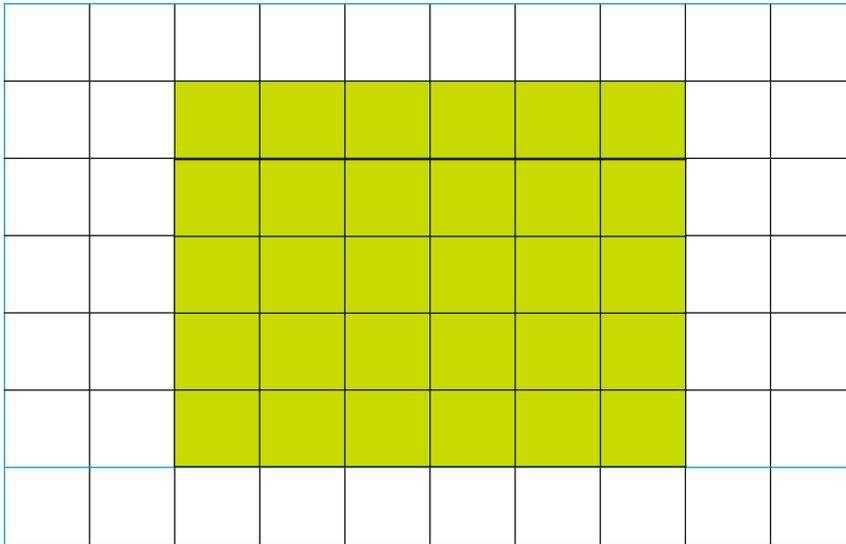
Perimeter of a rectangle = 2 Lengths + 2 Breadths

Find the perimeter of the following rectangles

Length	Breadth	Perimeter by adding all sides	Perimeter by the formula
10 units	5 units	$10 + 5 + 10 + 5 = 30$	$2 \times 10 + 2 \times 5 = 20 + 10 = 30$
15 units	10 units		
18 units	5 units		
12 units	8 units		

Activity - 3

(Using a grid paper find the perimeter of the square shaded)



Perimeter refers to the total length of the boundary.



$$\begin{aligned}
 \text{Perimeter of a square} &= 5 + 5 + 5 + 5 \\
 &= \text{side} + \text{side} + \text{side} + \text{side} \\
 &= 4 \times \text{Side}
 \end{aligned}$$

$$\text{Perimeter of square} = 4 \times \text{side}$$

Do these

- (1) Find the perimeter of a square with a side of 3 cms.
- (2) Find the perimeter of a square with a side of 12cms.

Activity - 1**Area**

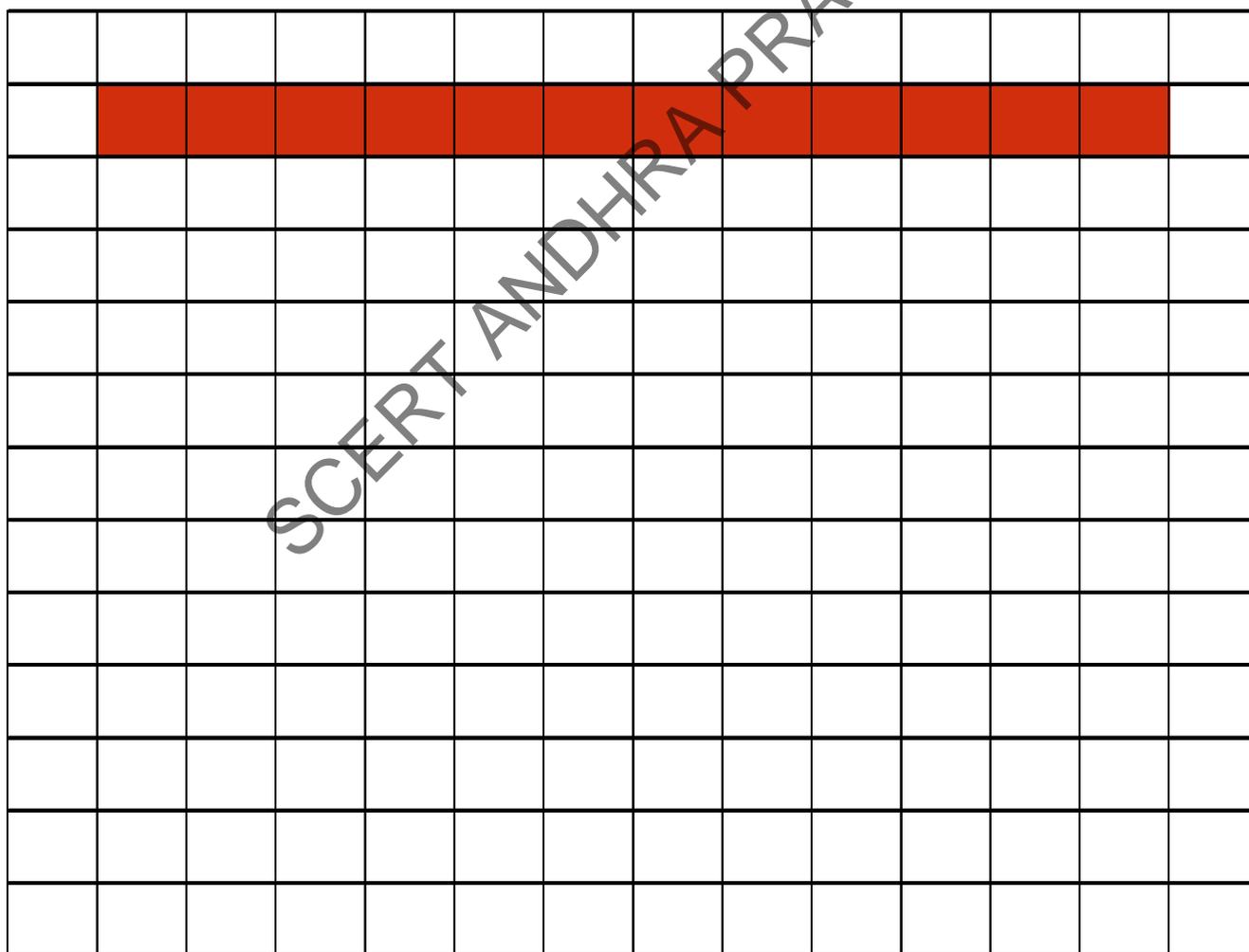
Ask the students to estimate how many Maths text books are needed to cover the surface of the table. After collecting the responses ask the children to cover the table with Maths textbooks in such a way that there is no gap among the books and no over lapping.



S. No	Name of the Student	Estimated Number	Actual Number
1			
2			
3			
4			

Activity - 2

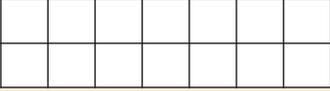
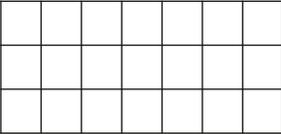
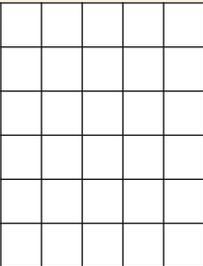
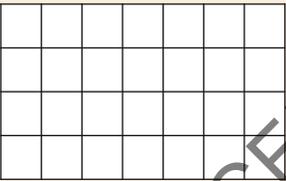
Use 12 squares to make as many types of rectangles as you can on the square sheet. Do all types of rectangles occupy same area? One is done for you.



What do you observe?

Activity - 3

(1) Find the area of the following figures (Grid Paper)

Figure	Length	Breadth	Area
	_____ cms	_____ cms	_____ sq.cms
	_____ cms	_____ cms	_____ sq. cms
	_____ cms	_____ cms	_____ sq.cms
	_____ cms	_____ cms	_____ sq.cms



What do you observe from the above ?

Area of a rectangle is product of its length and breadth

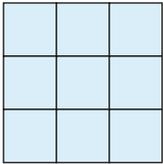
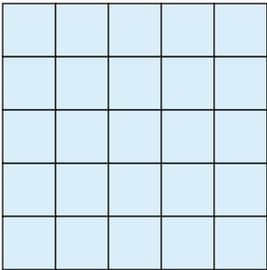
What is the formula for area of a rectangle ?



Area of a rectangle = Length x Breadth



Activity - 4

Figure	Side	Area
	_____ cms	_____ sq. cms
	_____ cms	_____ sq. cms

What do you observe from the above ?

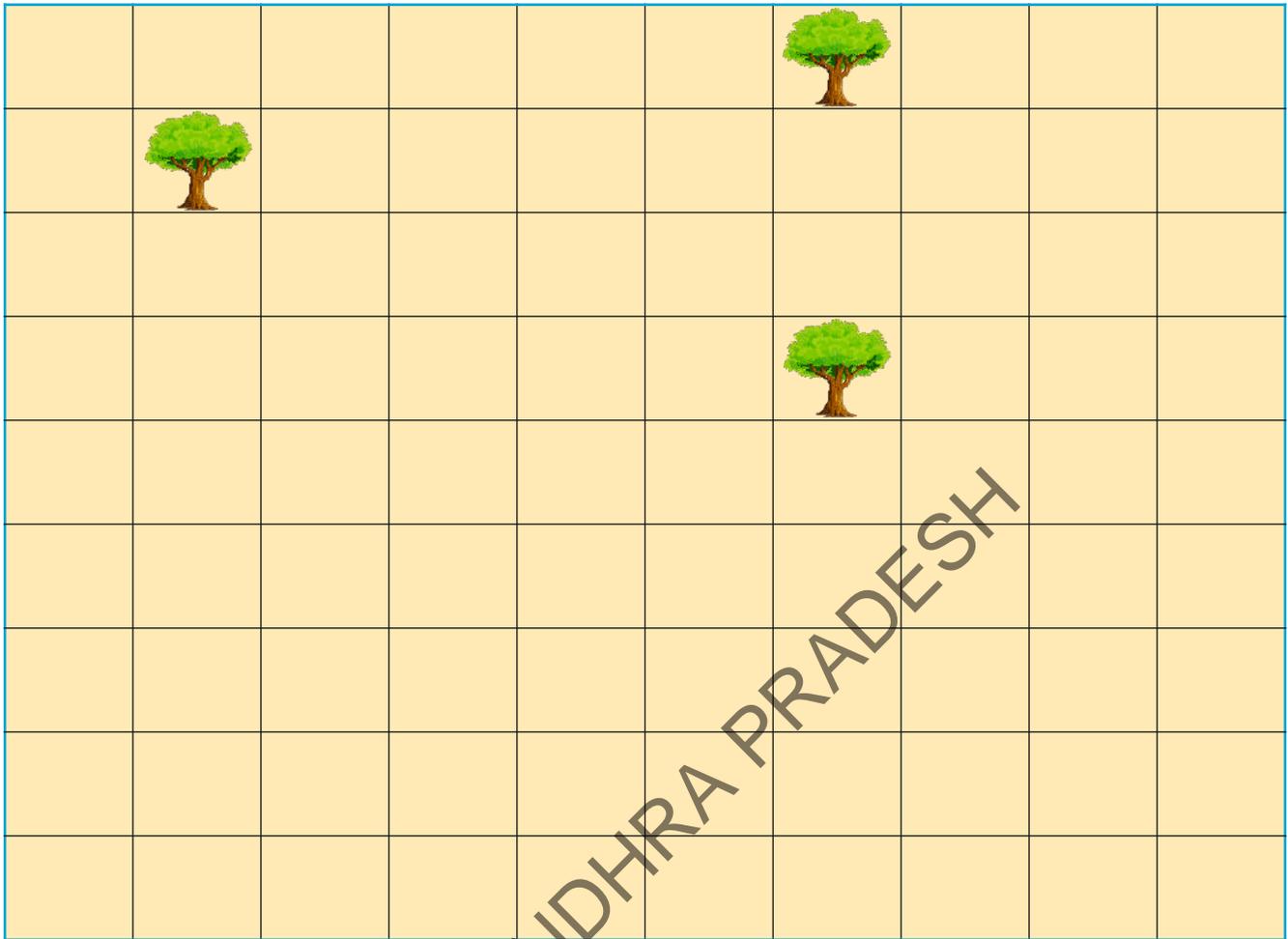


Area of a Square is obtained by multiplying side with side.

If in a rectangle, length and breadth are equal, it is called a square. Here length and breadths are called sides. All sides are equal in a square.
 Area of a square = side x side

Try this

Balu is a farmer who wants to divide his land equally to his three children. He wants to divide the land. His land look like this each piece of land has one tree. Can you divide the land equally?



Exercise - 5

- (1) Find the perimeter of a rectangular field whose length is 40m and breadth is 25m.
- (2) Find the perimeter of a park in square shape side with 25m.
- (3) Find the area of a square whose one side is 13cms.
- (4) Find the area of a black board with a length of 240cms and breadth 120cms.
- (5) Find the cost of fencing to a square park whose side is 200m. Cost for 1m is ₹ 30.
- (6) A piece of a wire is 28cm long. What will be the length of each side, if the wire is used to form a square?



7.1:- Tally marks:-

One day Class-V teacher Mrs. Lakshmi collected the data about their favourite flower from the students. One student noted the data on the black board as follows...

Rose, Rose, Marigold,
Jasmine, Rose, Marigold,
Rose, Lily, Rose, Jasmine,
Rose, Marigold, Jasmine,
Rose, Jasmine, Marigold,
Jasmine, Rose, Rose,
Jasmine, Rose, Marigold,
Rose, Marigold, Marigold,
Rose, Marigold, Rose, Lily,
Rose.



Complete the table by using the above data:

Name of the flower	Tally marks	Number
Jasmine		
Rose		
Marigold		
Lily		

Answer the following questions:

1. Which flower is liked by most of the students?
2. How many children liked rose flower?
3. Which flower is liked by less in number of students?

7.2:- Pictograph:-

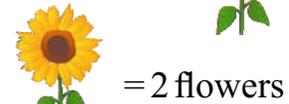


Is there any other way to compare the data easily?



Yes, we can use pictographs to compare the data.

Now, we compare the previous data by using pictograph. You have to use  to represent two flowers.



S. No.	Name of the flower	Number of pictures
1.	Jasmine	
2.	Rose	
3.	Marigold	
4.	Lily	



Will you explain how to prepare the pictograph?



Yes, observe the process given below.

Step 1 : Select / identify a suitable picture to represent the data. ()

Step 2 : Give a numerical value to the picture. ( = 2 flowers)

(The value must be a natural number. Ex: 2, 5, 10, 15, ...)

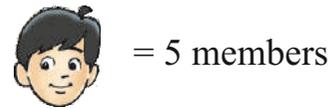
Step 3 : Draw the number of pictures according to the data.

Example: Marigold =  = $4 \times 2 = 8$ flowers

Step 4 : All the pictures should be in the same shape and size.

Example:

Observe the following pictograph and fill the columns.



S. No.	Game	Pictures	Number of players
1.	Kabaddi		
2.	Kho-Kho		
3.	Tennicoit		
4.	Cricket		

Answer the following questions:

1. How many players played Kabaddi?
2. Which game was played by most of the players?
3. Which game was played by only 10 members?

Pochaiah, Solman, Lingaiah, Kareem and Veeresam are fishermen in Tallarevu village. The number of the fish caught by them is given in the table. Draw a pictograph for the given data.

Fisherman	Pochaiah	Solman	Kareem	Lingaiah	Veeresam
Fish	90	100	30	80	50



= 10. i.e. Picture of one fish represents 10 fish.

S. No.	Name of the Fisherman	Pictures
1.	Pochaiah	
2.	Solman	
3.	Kareem	
4.	Lingaiah	
5.	Veereram	

Now answer the following questions.

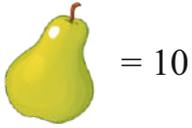
- How many fish Pochaiah caught more than Lingaiah?
- Is the number of fish caught by Lingaiah is equal to the total number of fish caught by Kareem and Veereram?
- How many fish pictures can you draw for Veereram? Why?
- Number of fish pictures equal to 100 fish are _____

One day Pochaiah's wife Mangamma went to a fruit market. She brought some fruits as given in the table below.

Fruits	Mango	Banana	Orange	Apple
Number of Fruits	20	30	50	20

Prepare a pictograph to the given data and present it in the class room.

Hint:



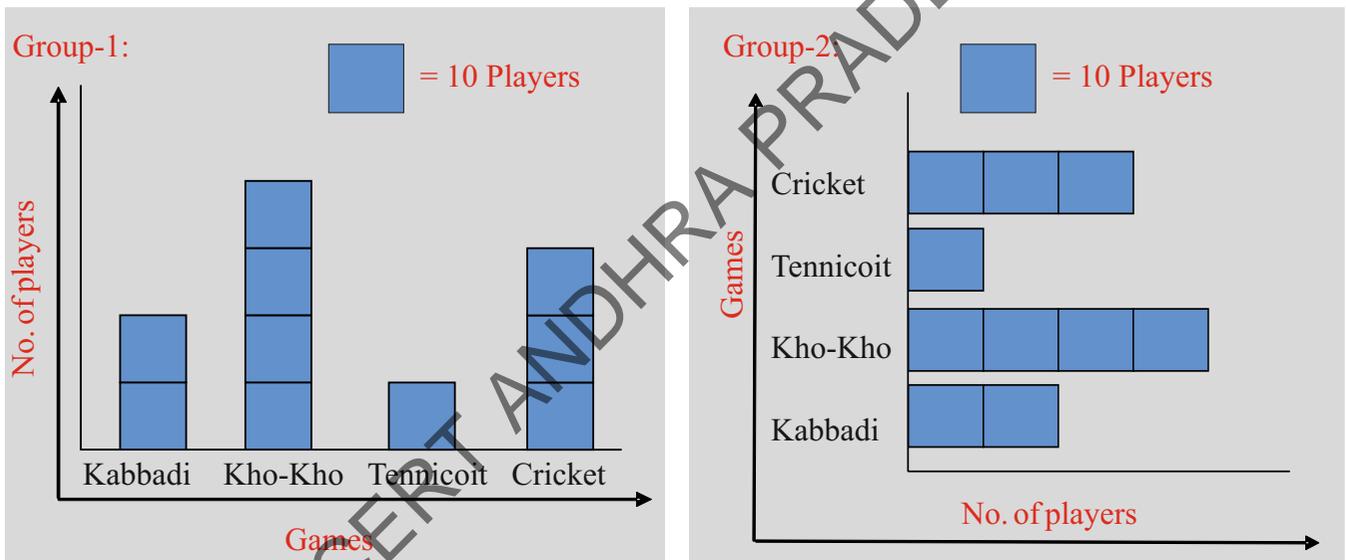
Type of fruit	Picture representation
Mango	
Banana	
Orange	
Apple	

Prepare some questions on the above data and discuss them in the classroom.

7.3:- Reading the Bar Graph:-

We can represent the data in another way also. Observe it carefully.

Class 5 students prepared data on players of different games in their school as shown below.



We can represent the data in both horizontal and vertical bars.

Now answer the following questions:

- How many players are there in the ground?
- The difference between number of players played kho-kho and tennicoit is equal to which game?
- Which game has 40 players ?
- “How many times” of number of tennicoit players is equal to number of kabbadi players?



A bar graph represents the data with equal width rectangular bars. Each bar graph has title and scales.

Example:

Rajani wants to compare her height with her four friends. She measured their heights and made a note like this.

Rajani – 120 cm

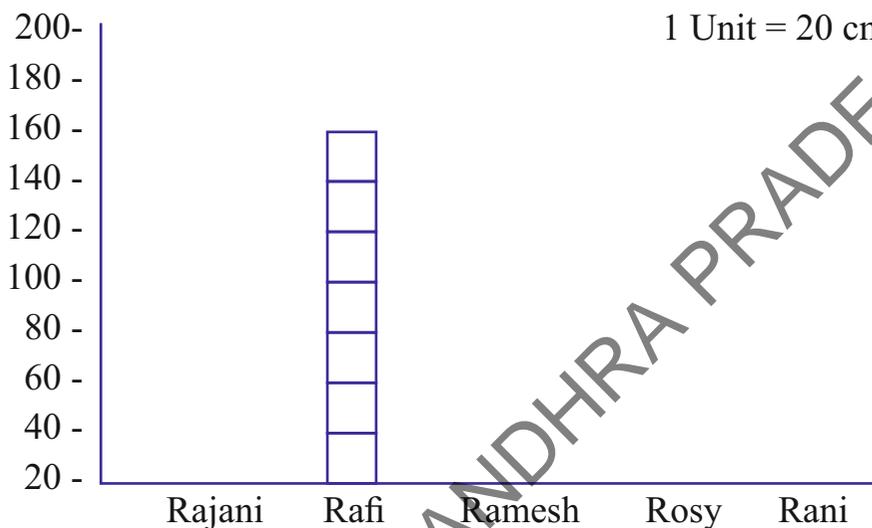
Rafi – 160 cm

Ramesh – 140 cm

Rosy – 140 cm

Rani – 160 cm

Help her to draw bar diagram.



Now answer the following questions:

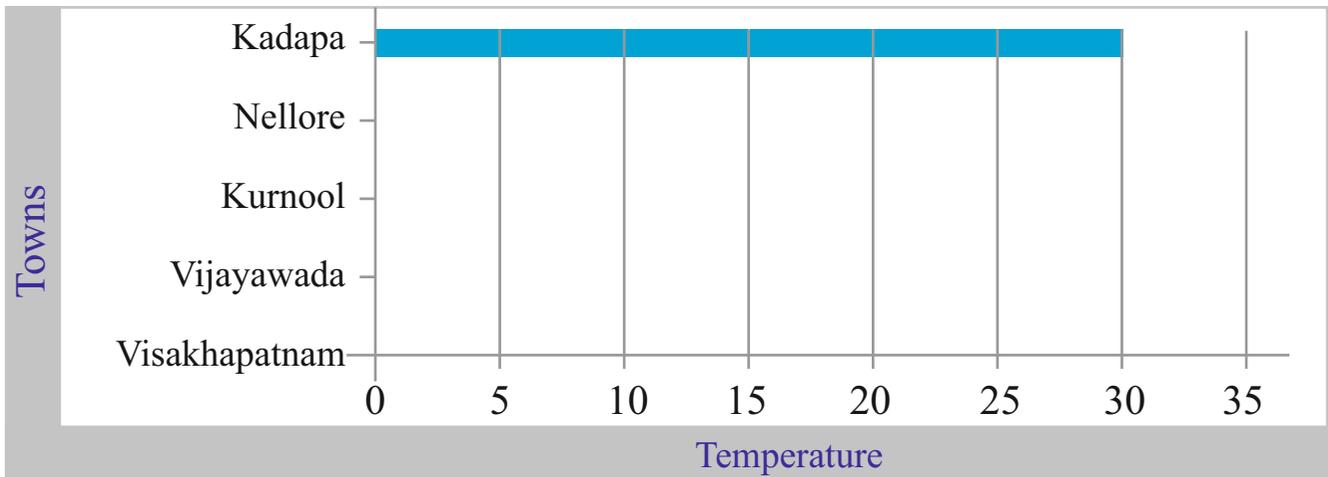
- Who is the shortest person?
- How much less height is Rafi to Rajani?
- Who is equal in height to Rajani?
- How much more height is Rajani than Rosy?

One day Rani collected the data of temperatures of 5 Major cities from news papers.

Prepare a bar diagram to the data and prepare 4 questions.

Name of the city	Kadapa	Nellore	Kurnool	Vijayawada	Visakhapatnam
Temperature in degrees	30 ⁰ c	35 ⁰ c	35 ⁰ c	25 ⁰ c	20 ⁰ c

Prepare a bar graph.



Exercise - 1

(1) Parvathi collected the data of pet animals from her friends and recorded it in a table. She displayed the table in the class room.

Pet animals	Tally marks	Number
Cat	/	5
Goat	/ /	10
Hen	/ /	13
Dog	/	6

Answer the following questions.

- 1) Which animal is petted more in number?
- 2) Which animal is petted less in number?
- 3) How many students have goat as a pet animal?
- 4) How many students have dog as a pet animal?

(2) The following table shows the number of tiles in different colours.

Colour	White	Blue	Black	Green	Red
Number of Tiles	250	170	200	100	150

Make a pictograph using the data and prepare some questions.

- (3) Ravi maintains a provisional store in Parvatipuram. He recorded the quantities of goods and items in his shop daily. One day he records the quantities of rice, wheat, red gram and sugar as shown below.

Items	Rice	Wheat	Red Gram	Sugar
Number of bags	60	30	40	20

Now prepare a bar diagram to the given data and followed by some questions.

Project:

Conduct a survey in your school. Collect the information and interpret the data. Make Tally marks chart / Pictograph / Bar graph.

- Favourite actor
- Favourite actress
- Favourite cricket player
- Favourite sweet
- Favourite movie
- Favourite drink.



Use of data handling:

Government and other voluntary organizations collect the data like census, animals' statistics, food supplies and financial disbursements. Based on the collected data, Government and others will estimate the future needs. (In fact everyone uses data collection and data analysis.)

Prasanta Chandra Mahalanobis (29 June 1893 – 28 June 1972) was an Indian scientist and **statistician**. He founded the Indian Statistical Institute - Kolkatta. Mahalanobis has been considered as the **father of modern statistics** in India.





8.1:- Types of Fractions:-

Hema and Gopi are studying 5th class and 3rd class respectively. One Sunday, they are playing a game “Asta – Chemma”. Observe the game board.

How many total cells are there ?

Which types of cells are there ?

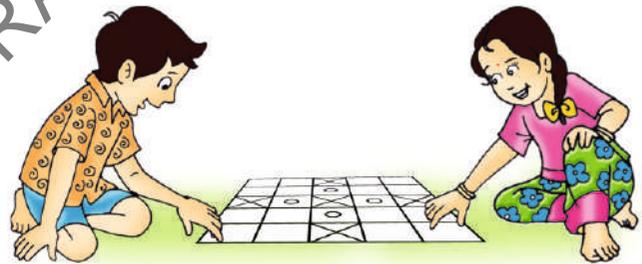
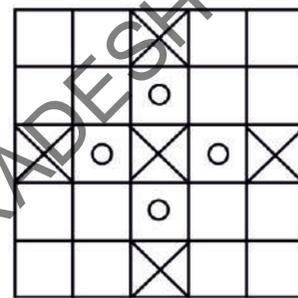
How many marked cells are there ?

Here No. of  marked cells = 5

No. of  marked cells = 4

No. of  un marked cells = 16

Total cells = 25



Can you write “fraction part” of marked cells & un marked cells?

fraction part of  marked cells = $\frac{5}{25}$

fraction part of  marked cells = $\frac{4}{25}$

fraction part of  unmarked cells = $\frac{16}{25}$

Observe these fractions : $\frac{5}{25}$, $\frac{4}{25}$, $\frac{16}{25}$

What is your observation ?

These are like fractions.

Fractions that have same denominators are called like fractions.



Proper Fractions: Observe the following table.

Fraction	Numerator	Denominator	Relation between numerator and denominator
$\frac{5}{25}$	5	25	$5 < 25$
$\frac{4}{25}$	4	25	
$\frac{16}{25}$	16	25	
$\frac{10}{13}$	10	13	
$\frac{13}{15}$	13	15	

What do you observe from the above table ?

Here, in all fractions the numerator is less than the denominator.

Fractions having numerator less than the denominator are called “**proper fractions**”.

Therefore $\frac{5}{25}$, $\frac{4}{25}$, $\frac{16}{25}$, $\frac{10}{13}$, $\frac{13}{15}$ are “proper fractions”.

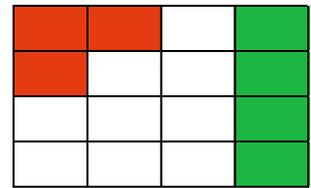
Activity - 1

Collect today's class wise attendance and enter in this table.

S.No.	Class	Roll	Present	Fraction	Is it proper fraction?
1.	I				
2.	II				
3.	III				
4.	IV				
5.	V				
	Total:				

(Hint: Take roll as denominator and present as numerator.)

Activity - 2



Observe 4×4 grid.

Write “fractions” for red, green, and white coloured parts.

fraction of red part =

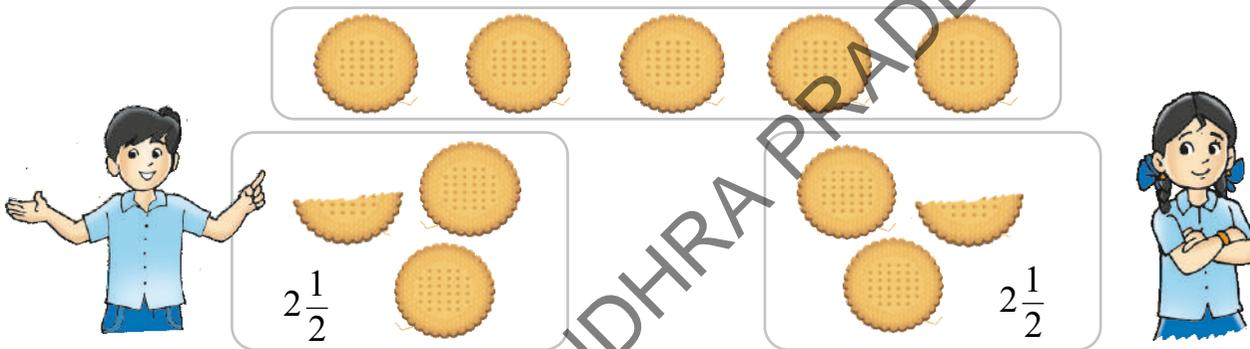
fraction of Green part =

fraction of white part =

What do you say about these fractions?

Mixed Fractions :

Hema's mother gave 5 biscuits to Hema and her brother Gopi. Then Hema shared these 5 biscuits in this way.



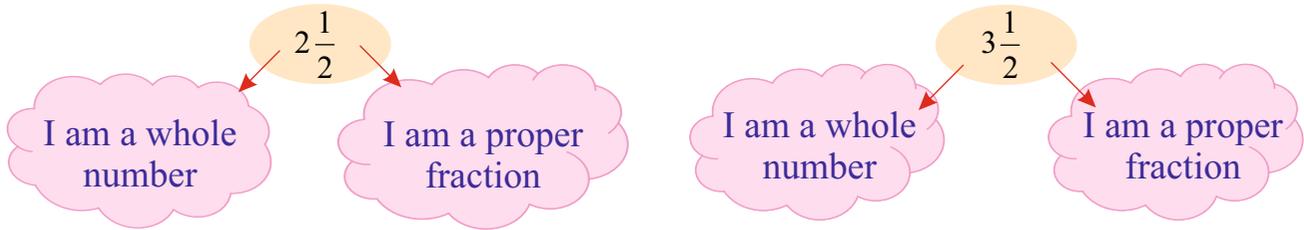
Hema and Gopi got 2 full biscuits and half biscuit each. This can be written as $2\frac{1}{2}$ biscuits.

If Hema and Gopi got 7 and 9 biscuits then complete this table.

No. of biscuits given	No. of biscuits each get		Total	Fraction
	Full biscuits	Part of biscuit		
5	2	$\frac{1}{2}$	$2 + \frac{1}{2}$	$2\frac{1}{2}$
7				
9				

Observe these fractions : $2\frac{1}{2}$, $3\frac{1}{2}$, $4\frac{1}{2}$,

What is your observation ?



Fraction having whole number and proper fraction is called “Mixed Fraction”.

So $2\frac{1}{2}$, $3\frac{1}{2}$, $4\frac{1}{2}$, are “mixed fractions”.

Improper Fraction :

Hema distributes 5 biscuits equally between 2; fraction form = $\frac{5}{2}$

If she distributes 7 biscuits equally among 3 ; fraction form = $\frac{7}{3}$

If she distributes 9 biscuits equally among 4 ; fraction form = $\frac{9}{4}$

If she distributes 2 biscuits equally between 2 ; fraction form = $\frac{2}{2}$

Observe these fractions : $\frac{5}{2}$, $\frac{7}{3}$, $\frac{9}{4}$, $\frac{2}{2}$

Fraction	Numerator	Denominator	Relation between numerator and denominator
$\frac{5}{2}$	5	2	$5 > 2$
$\frac{7}{3}$	7	3	
$\frac{9}{4}$	9	4	
$\frac{2}{2}$	2	2	

What do you say ?

Here in all fractions have numerator is greater than or equal to denominator.

These types of fractions are called improper fractions.

Ex: $\frac{5}{2}$, $\frac{7}{3}$, $\frac{9}{4}$, $\frac{2}{2}$

Do you know?

- *The value of proper fraction is always less than 1.*
- *The value of improper fraction is greater than or equal to 1.*

Do You Know? Improper and mixed fraction forms are same.

- 1) When an improper fraction is converted into a mixed fraction, the quotient forms its whole number part while the remainder over the divisor forms the fractional part.
- 2) To convert a mixed fraction into an improper fraction, multiply the denominator by the whole number and add the product to the numerator. This sum over the denominator gives an improper fraction.

Example : (1)



Fraction form of shaded part = $\frac{5}{2}$ or $2 + \frac{1}{2}$ so $\frac{5}{2} = 2 + \frac{1}{2} = 2\frac{1}{2}$

$$\text{and } 2\frac{1}{2} = \frac{(2 \times 2) + 1}{2} = \frac{4 + 1}{2} = \frac{5}{2}$$

$$\begin{array}{r} 2) 5 \quad (2 \\ -4 \\ \hline 1 \end{array}$$

Example : (2)

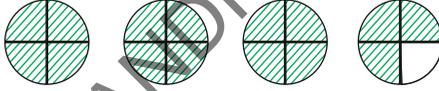


Fraction form of shaded part = $\frac{7}{3}$ or $2 + \frac{1}{3}$ so $\frac{7}{3} = 2 + \frac{1}{3} = 2\frac{1}{3}$

$$\text{and } 2\frac{1}{3} = \frac{(3 \times 2) + 1}{3} = \frac{6 + 1}{3} = \frac{7}{3}$$

$$\begin{array}{r} 3) 7 \quad (2 \\ -6 \\ \hline 1 \end{array}$$

Example : (3)



Fraction form of shaded part = $\frac{15}{4} = 3 + \frac{3}{4}$ so $\frac{15}{4} = 3 + \frac{3}{4} = 3\frac{3}{4}$

$$\text{and } 3\frac{3}{4} = \frac{(4 \times 3) + 3}{4} = \frac{12 + 3}{4} = \frac{15}{4}$$

$$\begin{array}{r} 4) 15 \quad (3 \\ -12 \\ \hline 3 \end{array}$$

Every improper fraction can be converted into mixed fraction and vice versa.

Improper fraction \rightleftharpoons Mixed fraction

Do these

- 1) Write any 5 proper fractions.
- 2) Write any 5 improper fractions.
- 3) Write any 5 mixed fractions.
- 4) Convert these fraction into mixed fraction $\frac{5}{2}$, $\frac{7}{3}$, $\frac{9}{4}$, $\frac{11}{2}$.
- 5) Convert these fractions into improper fraction $4\frac{2}{3}$, $5\frac{3}{4}$, $6\frac{2}{5}$, $3\frac{1}{2}$.

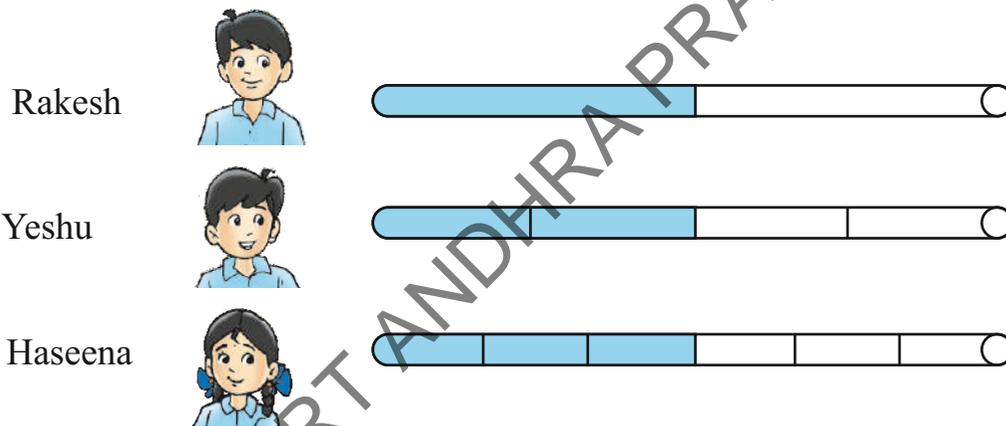
Maths Lab Activity

1	2	3
4	5	6
7	8	9

Using above digits 1, 2, 3, 4, 5, 6, 7, 8, 9 write proper fractions, improper fractions, mixed fractions as many as you can.

7.2:- Equivalent fractions :-

- * Rakesh takes an iron rod. He wants to paint the rod. First he marks the rod into 2 equal parts and paints 1 part of it.
- * Yesu takes the same length of iron rod and marks it into 4 equal parts and paints 2 parts of it.
- * Haseena takes the same length of iron rod and marks into 6 equal parts and paints 3 parts of it.



After painting all the three persons got surprised, why ?

The teacher clarified their doubt in this way.

$$\text{Part of the rod painted by Rakesh} = \frac{1}{2}$$

$$\text{Part of the rod painted by Yesu} = \frac{2}{4}$$

$$\text{Part of the rod painted by Haseena} = \frac{3}{6}$$

Everybody painted half portion of the rod i.e., $\frac{1}{2}$

By observing the painted parts, we come to know that $\frac{1}{2}$, $\frac{2}{4}$, $\frac{3}{6}$ are same

so, $\frac{2}{4}$, $\frac{3}{6}$ are “**EQUIVALENT FRACTIONS**” to $\frac{1}{2}$.

One more observation is $\frac{1}{2} \times \frac{2}{2} = \frac{2}{4}$; $\frac{1}{2} \times \frac{3}{3} = \frac{3}{6}$

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

To get equivalent fractions, we must multiply / divide both numerator and denominator by the same number.

Example : i) $\frac{1}{3} = \frac{1 \times 2}{3 \times 2} \left(\frac{2}{6}\right) = \frac{1 \times 3}{3 \times 3} \left(\frac{3}{9}\right)$

So, $\frac{2}{6}$, $\frac{3}{9}$ are equivalent fractions to $\frac{1}{3}$. $\therefore \frac{1}{3} = \frac{2}{6} = \frac{3}{9}$

ii) $\frac{16}{20} = \frac{16 \div 2}{20 \div 2} \left(\frac{8}{10}\right) = \frac{16 \div 4}{20 \div 4} \left(\frac{4}{5}\right)$;

So, $\frac{8}{10}$, $\frac{4}{5}$ are equivalent fractions to $\frac{16}{20}$. $\therefore \frac{16}{20} = \frac{8}{10} = \frac{4}{5}$

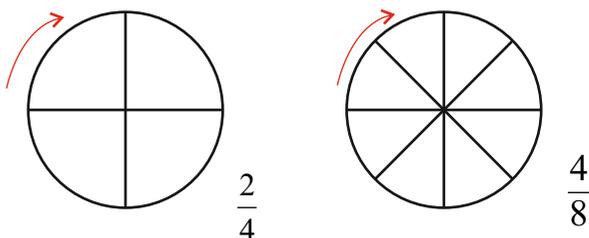
Activity - 3

(I) Shade the fraction part. What is your observation?



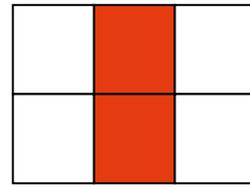
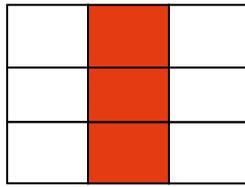
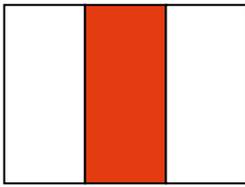
Observation: _____

II) Shade the fraction part. What is your observation? (Start from arrow)



Observation: _____

iii) Write fractions for the shaded part. What is your observation?



Observation : _____

Do these

1) Write any three equivalent fractions to the given fractions.

a) $\frac{4}{8}$

b) $\frac{1}{3}$

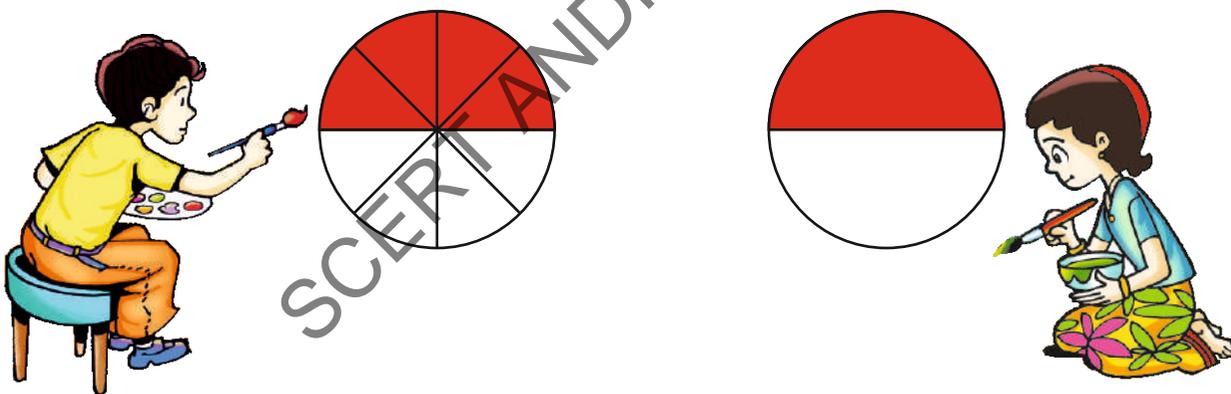
c) $\frac{3}{7}$

d) $\frac{20}{24}$

8.3:- Simplest form of Fraction:-

Example :1

Rajiv and Begum take two equal circular shapes. Rajiv divides his circular shape into 8 equal parts and Begum divides her circular shape into 2 equal parts.



Rajiv coloured 4 parts out of 8 parts. So fraction part equal to $\frac{4}{8}$.

Begum coloured 1 part out of 2 parts. So fraction part = $\frac{1}{2}$

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

So, $\frac{1}{2}$ is the simplest form / simplified form / lowest form of $\frac{4}{8}$.

That is why the coloured parts by Rajiv and Begum look like same.

Example : 2

Write the simplest form of the fraction $\frac{30}{36}$.

1st method : H.C.F of 30 and 36 is 6 $\frac{30}{36} = \frac{30 \div 6}{36 \div 6} = \frac{5}{6}$

So, $\frac{5}{6}$ is the simplest form of $\frac{30}{36}$.

If we divide both numerator and denominator by its H.C.F, we get the simple form of the given fraction.

2nd Method: **Cancellation Method**

$$\frac{30}{36} = \frac{\cancel{15}^5}{\cancel{36}_{18}^6} = \frac{5}{6} \quad (\because 30, 36 \text{ are divisible by } 2, 3)$$

Exercise - 1

1. Simplify the following fractions. (by cancellation method).

(I) $\frac{105}{15}$ (ii) $\frac{200}{20}$ (iii) $\frac{7}{10}$ (iv) $\frac{666}{66}$ (v) $\frac{125}{1000}$ (vi) $\frac{120}{200}$

2. Simplify the following fractions (by H. C .F method).

(i) $\frac{12}{18}$ (ii) $\frac{14}{35}$ (iii) $\frac{22}{55}$ (iv) $\frac{27}{36}$ (v) $\frac{128}{164}$ (vi) $\frac{210}{427}$

3) Convert the following fractions into the simplest form by both the methods.

(i) $\frac{16}{64}$ (ii) $\frac{12}{18}$ (iii) $\frac{30}{50}$ (iv) $\frac{40}{25}$ (v) $\frac{16}{32}$ (vi) $\frac{8}{40}$

4. To get equivalent fractions what should we do a given fraction?

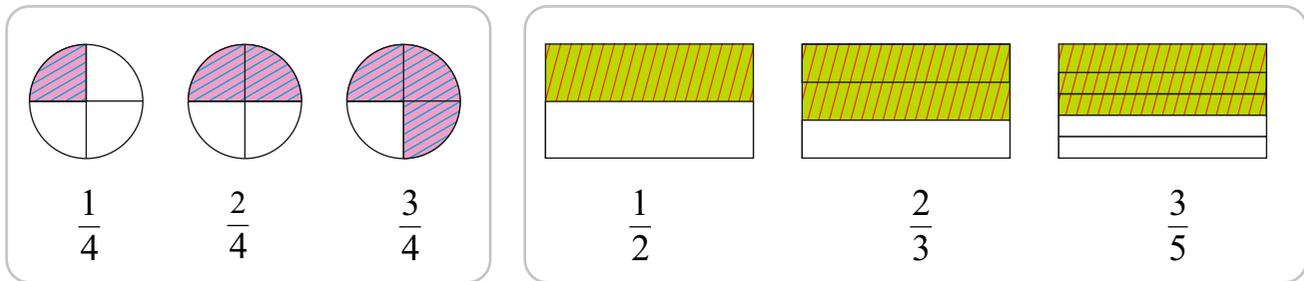
5. Write any three equivalent fractions to the given fractions.

(i) $\frac{5}{8}$ (ii) $\frac{32}{64}$ (iii) $\frac{3}{7}$ (iv) $\frac{125}{225}$ (v) $\frac{7}{10}$

6. Govindamma distributed her 4 acres of land to her 3 sons. Then write the part of land each got in the form of a fraction.

8.4:- Like and Unlike Fractions:-

See all the figures and it's shaded parts. Observe 1st set of fractions. We already know that fractions having same denominators are called “LIKE FRACTIONS”.

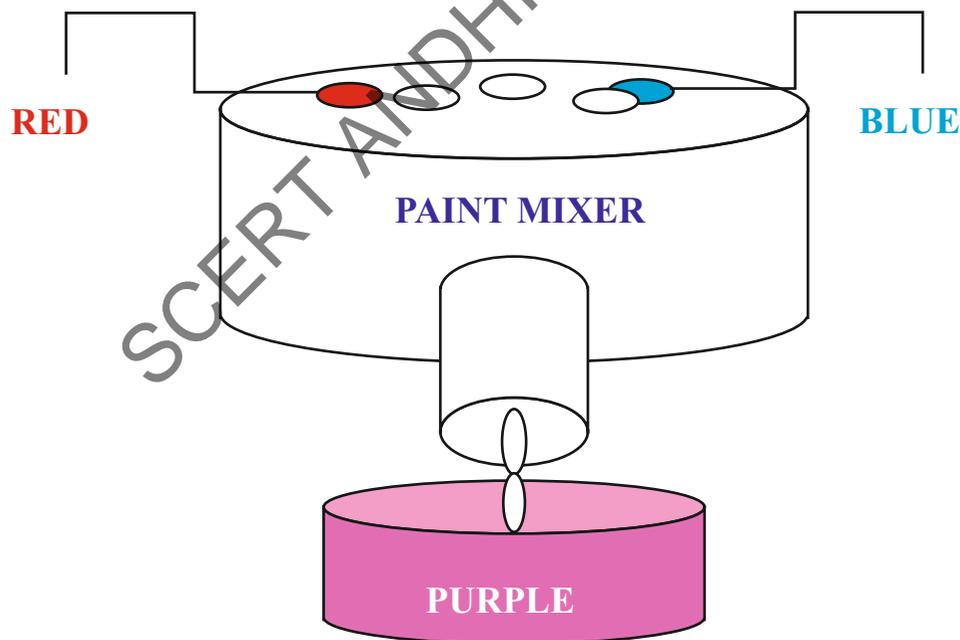


Observe 2nd set of fractions what is your observation? Here all fractions have different denominators. Fractions having different denominators are called “UNLIKE FRACTIONS”.

While checking like fractions /unlike fractions, what do we check ?

We check only denominators.

8.5:- Addition of Fractions:-

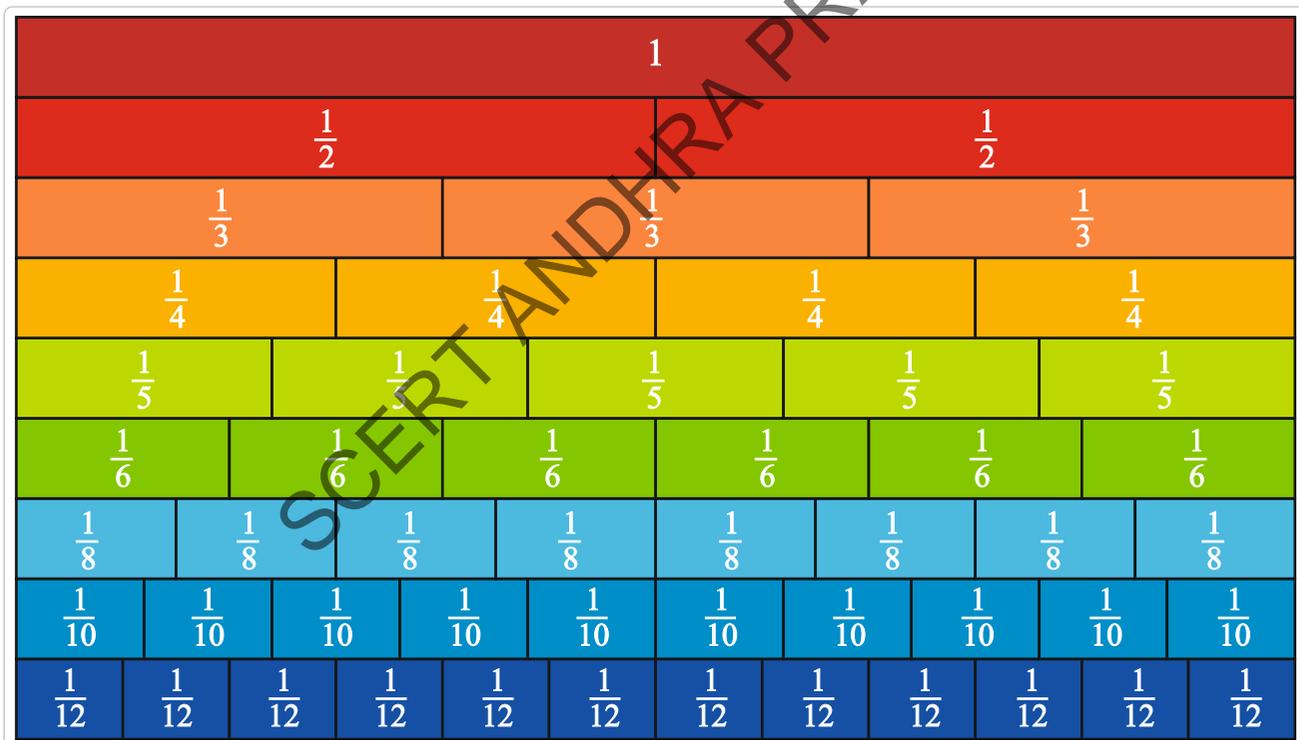


Raheem is working in a paint shop. His duty is to make all colours of paint. To make purple paint, Raheem mixed $\frac{5}{4}$ lit of red paint with $\frac{7}{4}$ lit of blue paint. Then how much purple paint does he get?

$$\begin{aligned}
 \text{Red paint taken} &= \frac{5}{4} \text{ lit} \\
 \text{Blue paint taken} &= \frac{7}{4} \text{ lit} \\
 \text{After mixing, purple colour prepared} &= \frac{5}{4} + \frac{7}{4} \\
 &= \frac{5+7}{4} \\
 &= \frac{12}{4} \\
 &= \frac{12}{4} = 3 \text{ lit}
 \end{aligned}$$

Activity - 4

Take 9 strips of same unit length. On 1st strip mark it as 1. Shade any colour on entire strip. Divide 2nd strip into two equal parts and mark it $\frac{1}{2}$ for two equal parts. Shade any different colour other than on 1st strip. Continue in this way.



What is your observation ?

We can observe that : $\frac{1}{2} + \frac{1}{2} = 1$, $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1$,.....

some more observations : $\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$, $\frac{1}{6} + \frac{1}{6} = \frac{1}{3}$,.....

Addition of Like Fractions

Consider two like fractions. For **Example:** $\frac{1}{5}, \frac{3}{5}$

Now add $\frac{1}{5}, \frac{3}{5}$

Method 1: $\frac{1}{5} + \frac{3}{5}$

$$= \boxed{\frac{1}{5}} + \boxed{\frac{1}{5}} \boxed{\frac{1}{5}} \boxed{\frac{1}{5}} = \frac{4}{5}$$

(They are like fractions)

Method 2: $\frac{1}{5} + \frac{3}{5} = \frac{1+3}{5}$
 $= \frac{4}{5}$

Example: $2\frac{1}{3} + 5\frac{1}{3} = \frac{7}{3} + \frac{16}{3}$
 $= \frac{7+16}{3}$
 $= \frac{23}{3}$

Example: Ramu read $\frac{1}{4}$ th part of a book on 1st day, $\frac{1}{4}$ th part on 2nd day. Then how much part did he read in two days ?

Solution : Part read on 1st day = $\frac{1}{4}$

Part read on 2nd day = $\frac{1}{4}$

Total part read in two days by Ramu = $\frac{1}{4} + \frac{1}{4}$

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

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

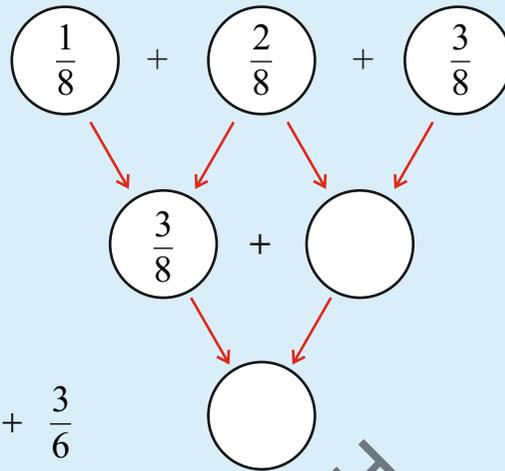
$$= \frac{1}{2}$$

Sum of like fractions
$$= \frac{\text{sum of numerators}}{\text{denominator}}$$



Do these

- 1) Observe the example and write the correct fractions in the other circles.



- 2) Find the sum.

i) $\frac{2}{10} + \frac{4}{10}$

ii) $\frac{2}{6} + \frac{3}{6}$

iii) $1\frac{1}{4} + 3\frac{1}{4}$

iv) $2\frac{1}{5} + 3\frac{1}{5}$

- 3) $\frac{1}{2}$ Kg of a sugar packet, $\frac{3}{6}$ kg of jaggery are in a bag. Then what is the total weight of two items in the bag ?
- 4) Sakru paints $\frac{1}{5}$ th part of a wall on first day, $\frac{2}{5}$ th part of the wall on second day. Then how much part he painted in both the days ?
- 5) Polamma had some money. She spent $\frac{3}{6}$ th part of money on books, $\frac{1}{6}$ th part of money on pens, pencils and erasers. Then how much part money did she spend in total?

Addition of unlike Fractions:

Consider two un-like fractions, i.e., $\frac{1}{3}$, $\frac{1}{2}$

Now add $\frac{1}{3} + \frac{1}{2}$

Method 1: $\frac{1}{3} + \frac{1}{2}$

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

$$= \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6}$$

$$= \frac{5}{6}$$

Method 2: $\frac{1}{3} + \frac{1}{2}$ (here L.C.M of 3, 2 = 6)

$$= \frac{1}{3} \times \frac{2}{2} + \frac{1}{2} \times \frac{3}{3} \quad (\text{L.C.M} = 6, \text{ to make same denominators})$$

$$= \frac{2}{6} + \frac{3}{6} = \frac{5}{6}$$

Example : $5\frac{1}{6} + 3\frac{1}{12} = \frac{31}{6} + \frac{37}{12}$ (L.C.M of 6, 12 = 12)

$$= \frac{31}{6} \times \frac{2}{2} + \frac{37}{12} \times \frac{1}{1}$$

$$= \frac{62+37}{12}$$

$$= \frac{99}{12}$$

Another process:

$$5\frac{1}{6} + 3\frac{1}{12} = \frac{31}{6} + \frac{37}{12}$$

$$= \frac{31 \times 2 + 37 \times 1}{12}$$

$$= \frac{62+37}{12}$$

$$= \frac{99}{12}$$

Example : Narasamma ate $\frac{1}{3}$ rd part of bread on Monday, $\frac{1}{4}$ th part of the bread on Tuesday. Then how much part of the bread she ate on two days ?

Sol : Part of bread eaten on Monday = $\frac{1}{3}$

Part of bread eaten on Tuesday = $\frac{1}{4}$

Part of bread eaten by Narasamma on two days

$$= \frac{1}{3} + \frac{1}{4} \quad (\text{here L.C.M of 3, 4=12})$$

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

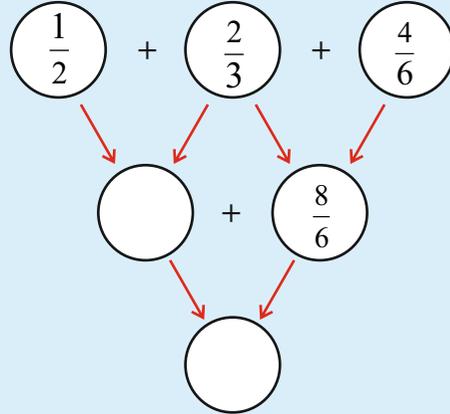
(L.C.M =12, to make same denominators)

$$= \frac{4}{12} + \frac{3}{12}$$

$$= \frac{7}{12}$$

Do these

1) Complete this



2) Find the sum.

i) $\frac{1}{5} + \frac{3}{4}$

ii) $\frac{3}{4} + \frac{5}{6}$

iii) $1\frac{2}{3} + 2\frac{5}{6}$

iv) $3\frac{1}{8} + 2\frac{5}{6}$

3) Seetamma read $\frac{1}{5}$ th part of a book on Monday, $\frac{4}{10}$ th part of the book on Tuesday. Then how much part did she complete on two days?

4) Polayya painted a wall of $\frac{1}{5}$ ^h part on 1st day and $\frac{3}{6}$ th part of the wall on 2nd day. Then how much part he painted the wall in two days?

Try this

Add $5\frac{6}{8}$, $4\frac{1}{7}$

8.6:- Subtraction of Fractions:-

There is $\frac{8}{16}$ th part of mineral water in a bottle. Saroja drink $\frac{1}{16}$ th part of the water. Then how much part of water is remained in the bottle?

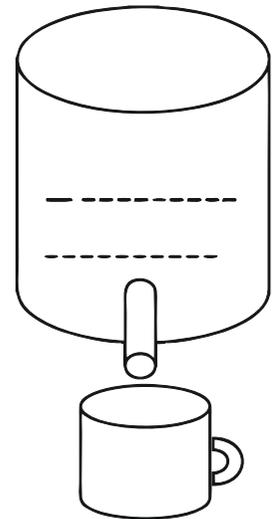
$$\text{Part of mineral water in bottle} = \frac{8}{16}$$

$$\text{Part of mineral water drunk} = \frac{1}{16}$$

$$\text{Part of mineral water remained} = \frac{8}{16} - \frac{1}{16}$$

$$= \frac{8-1}{16}$$

$$= \frac{7}{16}$$



Observe that while doing subtraction of like fractions, we subtract only numerators, denominators remains the same.

Subtraction of Like Fractions

Consider two like fractions i.e; $\frac{4}{5}$, $\frac{1}{5}$

Now calculate : $\frac{4}{5} - \frac{1}{5}$

Method 1 : $\frac{4}{5} - \frac{1}{5} = \frac{1}{5} \frac{1}{5} \frac{1}{5} \frac{1}{5}$
 $= \frac{1}{5} \frac{1}{5} \frac{1}{5}$
 $= \frac{3}{5}$

Method 2 : $\frac{4}{5} - \frac{1}{5} = \frac{4-1}{5} = \frac{3}{5}$

Example: $2\frac{4}{5} - 2\frac{1}{5} = \frac{14}{5} - \frac{11}{5} = \frac{3}{5}$

Example: Krishna read $\frac{1}{4}$ part of a book on first day. How much part of book is yet to be completed ?

Sol : Completed part on first day = $\frac{1}{4}$

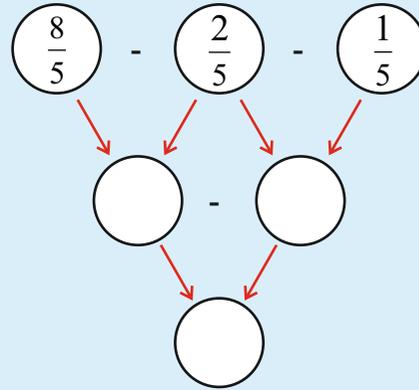
Yet to be completed part = $1 - \frac{1}{4}$
 $= \frac{4}{4} - \frac{1}{4}$
 $= \frac{4-1}{4}$
 $= \frac{3}{4}$

Difference of like fractions
 $= \frac{\text{Difference of numerators}}{\text{denominator}}$



Do these

1. Complete this :



2. Do the following.

i) $\frac{6}{10} - \frac{1}{10}$

ii) $\frac{3}{15} - \frac{1}{15}$

iii) $1\frac{3}{15} - 1\frac{1}{15}$

iv) $2\frac{4}{7} - 1\frac{2}{7}$

3. Eswar painted $\frac{1}{6}$ th part of a wall on first day. Then how much part will remain to complete?

4. Gowri completed $\frac{1}{4}$ th part of her homework on Saturday, $\frac{5}{12}$ th part on Sunday morning. How much part did she complete? How much part of home work is left ?

Subtraction of Unlike Fractions

Consider two unlike fractions i.e., $\frac{3}{4}$, $\frac{1}{2}$. Now calculate $\frac{3}{4} - \frac{1}{2}$

Method 1 :

$$\frac{3}{4} - \frac{1}{2}$$

$$= \frac{1}{4} + \frac{1}{4} + \frac{1}{4} - \frac{1}{2}$$

$$= \cancel{\frac{1}{2}} + \frac{1}{4} - \cancel{\frac{1}{2}}$$

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

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

$$\begin{aligned}
 \text{Method 2 : } & \frac{3}{4} - \frac{1}{2} \quad (\text{L.C.M. of } 4, 2 = 4) \\
 & = \frac{3}{4} - \frac{1}{2} \times \frac{2}{2} \quad (\text{L.C.M} = 4, \text{ To make same denominator}) \\
 & = \frac{3}{4} - \frac{2}{4} \\
 & = \frac{3-2}{4} \\
 & = \frac{1}{4}
 \end{aligned}$$

Example : Rakesh has $\frac{3}{4}$ th part of a glass with milk. He drank $\frac{1}{8}$ th part of glass. Now how much part of milk is remained in the glass?

Sol : Part of milk in the glass = $\frac{3}{4}$

Part of milk drank = $\frac{1}{8}$

Part of milk remained = $\frac{3}{4} - \frac{1}{8}$

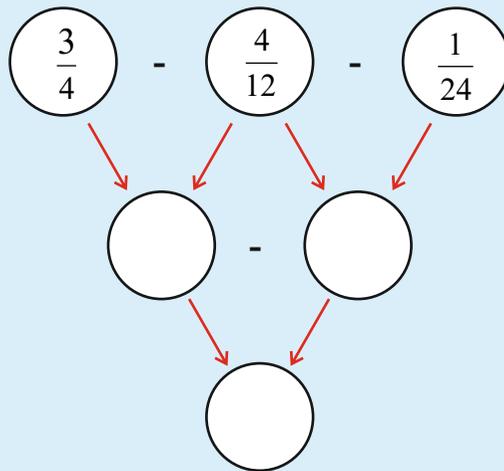
$$\begin{aligned}
 & = \frac{3}{4} \times \frac{2}{2} - \frac{1}{8} \\
 & = \frac{6}{8} - \frac{1}{8} \\
 & = \frac{5}{8}
 \end{aligned}$$

2nd Process

$$\begin{aligned}
 \frac{3}{4} - \frac{1}{8} & = \frac{3 \times 2 - 1 \times 1}{8} \\
 & = \frac{6-1}{8} \\
 & = \frac{5}{8}
 \end{aligned}$$

Try these

1) Complete this:



Exercise - 2

1) Do the following.

a) $\frac{3}{4} + \frac{7}{4}$

b) $1\frac{1}{2}$

c) $\frac{8}{3} + \frac{2}{5}$

d) $\frac{6}{3} + \frac{7}{4}$

e) $\frac{3}{5} + \frac{9}{11}$

f) $\frac{10}{10} + \frac{5}{20}$

g) $\frac{9}{10} + \frac{4}{15}$

h) $\frac{5}{20} + \frac{13}{30}$

2) Do the following.

a) $\frac{3}{7} - \frac{1}{7}$

b) $6 - \frac{1}{3}$

c) $\frac{3}{8} - \frac{3}{16}$

d) $\frac{3}{4} - \frac{1}{5}$

e) $\frac{8}{7} - \frac{5}{8}$

f) $\frac{13}{15} - \frac{7}{20}$

g) $\frac{63}{40} - \frac{9}{10}$

h) $\frac{7}{15} - \frac{3}{10}$

3) Find the difference between $5\frac{1}{3}$ and $2\frac{4}{7}$.

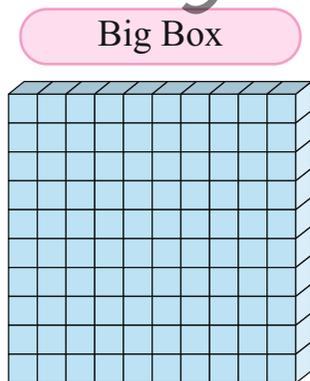
4) Seetha purchased $1\frac{1}{2}$ litre of sunflower oil, $\frac{3}{4}$ litre of groundnut oil. How much of oil she purchased in total?

5) Vimala purchased $1\frac{3}{4}$ m of cotton cloth for skirt, $\frac{3}{4}$ m of cloth for blouse. How much cloth is purchased by her?

6) A water tank is filled with $\frac{9}{10}$ th part of water. But $\frac{3}{5}$ th part of water is consumed in a day. Then find the remaining part of water in the tank ?

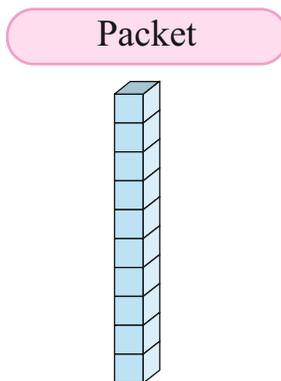
8.9:- Decimal Fractions:-

One day a foot wear shop keeper received a big box. It has 10 packets of same size. In each packet he found 10 single boxes each with a pair of shoes. He sold one shoe box on the first day.



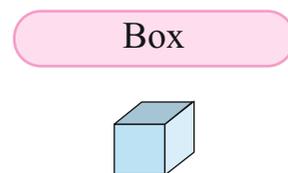
100 Shoe Boxes

Figure - 1



10 Shoe Boxes

Figure - 2

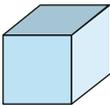


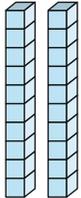
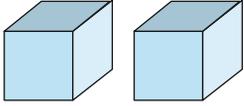
1 Shoe Box

Figure - 3

If the big box containing 100 shoes is considered as 1 unit (whole),

Part of whole  = $\frac{1}{10}$

part of whole  = $\frac{1}{100}$

So,  stands for $\frac{2}{10}$;  stands for $\frac{2}{100}$

$$\frac{1}{100} = 0.1$$

$$\frac{1}{100} = 0.01$$

$$\frac{1}{1000} = 0.001$$

What do you observe in these fractions $\frac{1}{10}$, $\frac{1}{100}$, $\frac{2}{10}$, $\frac{2}{100}$?

Here denominators are 10, 100.

Fractions having denominators 10, 100, 1000,... are called “DECIMAL FRACTIONS”.

Ex: 1) $\frac{125}{10} = 12.5$ 2) $\frac{345}{100} = 3.45$ 3) $\frac{4534}{1000} = 4.534$ 4) $\frac{345672}{1000} = 345.672$

Place value in decimal fraction:

Whole Numbers			Decimal point	Decimal Fractions		
Hundreds	Tens	Ones		Tenths	Hundredths	Thousandths
2	8	5	•	1	4	3
← 2 x 100	← 8 x 10	← 5 x 1		← 1/10	← 4/100	← 3/1000

We read 285.143 as “Two Hundred Eighty Five point One Four Three”.

Place value of 2 = 200	Place value of 1 = $\frac{1}{10}$
Place value of 8 = 80	Place value of 4 = $\frac{4}{100}$
Place value of 5 = 5	Place value of 3 = $\frac{3}{1000}$

Do these

1. Read 485.267
2. Write the place value of all digits in 293.819
3. Write any 5 examples for decimal fractions.

Do You Know?

Ancient Indians represented fractions without horizontal line between numerator and denominator.

The Arabs added the line drawn horizontally.

“Bhinnarasi” is originated in India in the works of Aryabhata, Brahmagupta and Bhaskara.

The word fraction is from Latin word fractus / fractio means broken / break.

Exercise - 3

Fill in the blanks.

- a) In improper fraction, numerator is ----- than the denominator.
 - b) $\frac{6}{6}$ is ----- fraction (which type?)
 - c) $3\frac{1}{2}$ is ----- fraction (which type?)
 - d) $\frac{9}{6}$ is ----- fraction (which type?)
 - e) $\frac{2}{5}$ is ----- fraction (which type?)
 - f) A fraction having whole number and proper fraction is called ----- fraction.
2. Convert $\frac{9}{6}$ into mixed- fraction.
 3. Convert $2\frac{1}{5}$ into an improper- fraction.
 4. Write any 5 equivalent fractions to $\frac{2}{3}$.
 5. Write simplest form of fraction for $\frac{25}{75}$.

6. Write two equivalent fractions to $\frac{64}{36}$.

7. Classify the following as like and unlike fractions.

$$\frac{3}{5}, \frac{2}{7}, \frac{8}{5}, \frac{9}{5}, \frac{8}{4}, \frac{1}{5}$$

8. Fill in the blanks.

a) $\frac{15}{20} = \frac{3}{\square}$

b) $\frac{2}{5} = \frac{\square}{50}$

c) $\frac{3}{5} = \frac{\square}{30}$

9. Fill in the blanks with = or \neq (\neq denotes not equal to)

a) $\frac{1}{2}$ ----- $\frac{8}{16}$

b) $\frac{9}{15}$ ----- $\frac{27}{30}$

c) $\frac{6}{13}$ ----- $\frac{12}{39}$

10. Fill in the blanks with equivalent fractions.

a) $\frac{1}{2}$ ----- $\frac{8}{16}$ -----, -----, -----

11. a) $\frac{6}{5} + \frac{1}{5} = \dots\dots\dots$ b) $\frac{5}{7} + \frac{2}{14} = \dots\dots\dots$ c) $\frac{15}{32} + \frac{3}{8} = \dots\dots\dots$ d) $\frac{11}{16} + 1\frac{1}{8} = \dots\dots\dots$

12. Kavitha studied $\frac{1}{2}$ part of a book on 1st day, $\frac{1}{3}$ part on 2nd day, then how much part she studied in both the days?

13. Koushik went to school $\frac{1}{4}$ km by walk. He went on bicycle with his friend for the remaining distance $\frac{3}{4}$ km. Then find the distance to school from his house.

14. a) $\frac{8}{10} - \frac{2}{10} = \dots\dots\dots$ b) $\frac{1}{3} - \frac{1}{9} = \dots\dots\dots$ c) $\frac{15}{32} - \frac{3}{8} = \dots\dots\dots$ d) $6\frac{1}{16} - 1\frac{1}{8} = \dots\dots\dots$

15. $\frac{2}{3}$ rd part of students in a school is boys. Find the part of girls.

16. Subtract $\frac{21}{4}$ from the total of $\frac{7}{2}$ and $\frac{8}{3}$.

17. Govind studied $\frac{2}{5}$ th part of a book on 1st day, $\frac{1}{7}$ th part on 2nd day. Then how much part is yet to be completed?

18. Write in words 189.257

19. Write the place value of 6 in 489.167





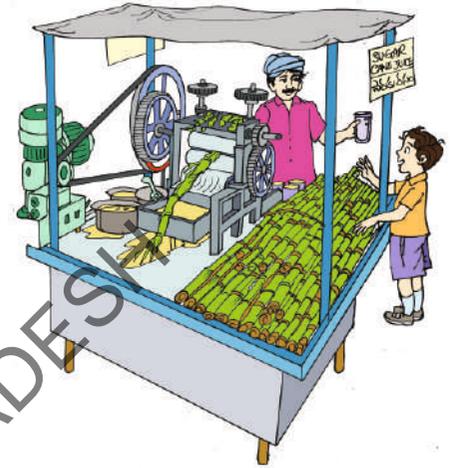
9.1:- Measuring in millimetres:-

Siva felt thirsty while walking along the road and saw a sugarcane juice centre on the road side. He ordered for a glass of juice. The juice seller squeezes one glass of juice from a sugar cane. Siva estimated the length of sugarcane.

Teacher : Can you estimate the length of sugar-cane?

Student : Yes, it is about 2 metres.

Teacher : If you cut into small pieces, in which units we measure them?



*To measure the small things, we use centimetre (cm).
To measure length in cm, we use scale.*



Activity

With the help of a scale, measure the length of a table in your class.

Do these

1. Guess the distance between any two dots. Repeat for other dots also. Check by measuring the same with scale.
2. Identify and write farthest two dots. Identify nearest to each other.

A.

.C

B.

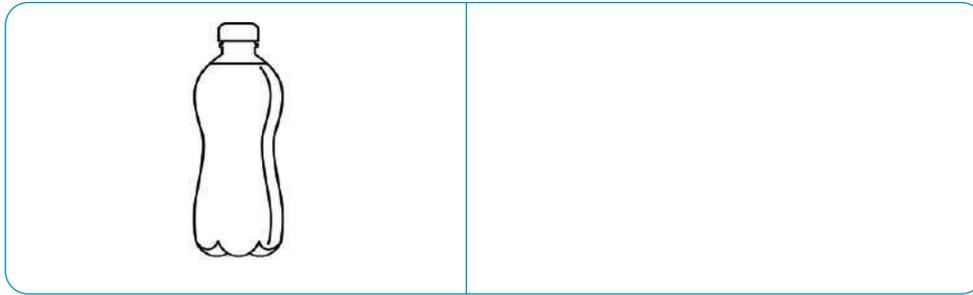
.D

.J

3. Draw another pencil longer by one cm than the given one.



4. Draw a water bottle 1 cm shorter to this.



Why to measure in millimetres?

Rekha and Shiva are measuring the lengths of some objects in centimetres and metres.

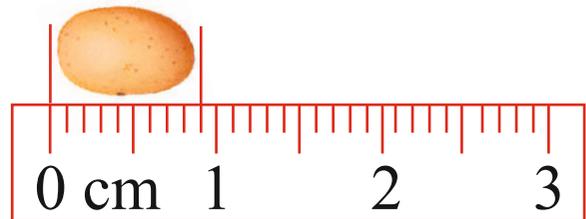
Let's measure the following things using scale or tape and fill in the table.

Thing	Comb	Water bottle	Spoon	Skipping rope	Hand stick
Length (cm)					

While they are doing the work, Latha brought one groundnut seed and asked “can you measure the length of this seed?” They tried to measure it in centimetres. But they observed that length of the seed is below 1 centimetre.

Can you measure the length of the seed?

Look at this picture.



Observe the above picture and write the answers.

At which starting point of the scale, the groundnut seed is placed? _____

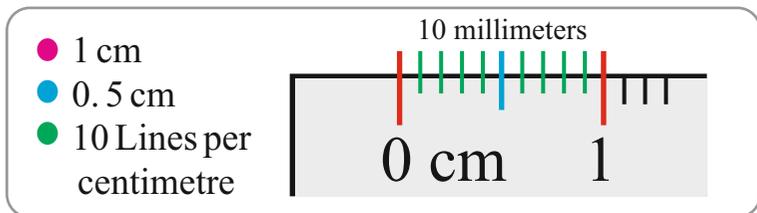
Count the unnumbered lines it covered _____

Is it one centimetre? _____

The distance between 0 to 1 is divided into _____ equal parts.

The numbered lines correspond to centimeters, while the unnumbered lines indicate **millimetres**. We write millimetres as **mm** in short form. So 1 centi-metre is equal to 10 millimetres and $1 \text{ mm} = 1/10 \text{ cm}$ ($1 \text{ mm} = 10^{\text{th}}$ part of $1 \text{ cm} = 0.1 \text{ cm}$)

A scale represents two units “centimetre and millimetre”.



Now count the millimetres the peanut has covered. It is _____ mm.

Do this

Give some examples which we have to measure only in millimetres.

1. _____ 2. _____ 3. _____ 4. _____

Activity

Measuring the length of a safety pin:



Observe the adjacent picture and write answers.

- At which starting point is the safety pin placed? _____
- Count the centimetres it covered _____ cm
- Count the unnumbered lines the pin covered after 1 cm _____
- The safety pin covered _____ cm and _____ millimetres.

Meera measures it in millimetres
 $1 \text{ cm} + 4 \text{ mm} = 10 \text{ mm} + 4 \text{ mm} = 14 \text{ mm}$

Try this

Find the thickness of your writing pad.

Centimetre and Millimetre:
 The observations of class 5 students about the distance between two plants in fields are given in a table. They want to convert them into millimetres.
 We know that $1 \text{ cm} = 10 \text{ mm}$

Name of the student	Plants	Distance in centimetres	Distances in millimetres
Swathi	Rose plants	80 cm	$80 \times 10 \text{ mm} = 800 \text{ mm}$
Sudeepa	Jasmine plants	45 cm	
Sumera	Peanut plants	30 cm	
Santha bai	Tomato	75 cm	

Do you know

To convert higher unit to lower units, we need to multiply.

To convert lower unit to higher unit, we need to divide.

Activity

Ask the students to observe the length of the following things and convert them into centimetres.

We know that $1 \text{ mm} = 1/10 \text{ cm}$

Name of the student	objects	Length in mm	Length in cm
Jubair	Textbook	220	$220 \div 10 = 22 \text{ cm}$
Somla	Pen	115	
Jack	Slate	180	
Malli	Brick	200	

Study the following table:

	Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths
Metric units	Kilo (1000)	Hecta (100)	Deca (10)	Basic unit 1	deci (1/10)	Centi (1/100)	milli (1/1000)
Length	Kilometre	Hectametre	Decametre	Metre	Decimetre	Centimetre	Millimetre
Weight	Kilogram	Hectagram	Decagram	Gram	Decigram	Centigram	Milligram
Capacity	Kilolitre	Hectalitre	Decalitre	Litre	Decilitre	Centi litre	Millilitre

We commonly use kilometre to measure far distances. Metre, centimetre and millimetre are used to measure objects, clothes etc..

	Thousands	Ones	Hundredths	Thousandths
Metric units	Kilo	Basic unit	Centi	milli
	X 1000	1	1/100	1/1000
Length	Kilometre	Metre	Centimetre	Millimetre



Why should I learn about millilitres, centimetres, metres etc... and convert it into different measurements?

Sumi is searching for a scale. When she found it was broken into some pieces. She stuck two pieces with fevistick and observed another one piece was missing. How could she tell it?



Imran identified that Sumi has done both addition and subtraction. He explained an addition example like this.

Example-1:

The lengths of two pieces are 12 cm 3 mm and 6 cm 2 mm. The total length of two pieces is:

$$\begin{array}{r}
 \text{Solution:} \quad \text{cm} \quad \text{mm} \\
 12 \quad 3 \\
 + \quad 6 \quad 2 \\
 \hline
 18 \text{ cm } 5 \text{ mm} \\
 \hline
 \end{array}$$

Imran identified how Sumi told the other piece is missing. He subtracts the length of two pieces from the total length of a scale that is 30cm. He gave an example to subtraction.

Example-2: Subtract 18 cm 5 mm

from 30 cm

Solution:

cm	mm
30	0
(-) 18	5
<hr/>	
11 cm	5 mm
<hr/>	

Example-3:

Length of a pen is 13 cm 8 mm. 8 pens are arranged in row, without spacing. What is the length of the row?

Solution:

Length of pens = 13 cm 8 mm

No. of pens = 8

Length of row = 13 cm 8 mm

	x 8
<hr/>	
110 cm	4 mm
<hr/>	

Exercise - 1

A) Find the sum of the following.

1) 7 cm 5 mm + 9 cm 6 mm

2) 82 cm 8 mm + 92 cm 2 mm

B) Subtract the following.

1) 26 cm 4 mm from 43 cm 3 mm

2) 87 cm 6 mm from 91 cm 9 mm

C) Multiply the following.

1) 18 cm 6 mm x 5

2) 54 cm 3 mm x 23

D) Solve the following problems.

1) Rafi said "the length of my finger nail is 5 cm and the length of my finger is 7 mm". Is he correct? Give reasons.

2) Gouse measured the length of his compass box as 12 cm 5 mm. Babu said that the length of his box is 2 cm 5 mm more than that. Find Babu's box length.

3) Madhavi made a garland with a length of 80 cm. Later she added 60 cm garland piece to that. How much length of garland it became?

4) Mythili broke a pencil with a length of 18 cm into two pieces. If the length of one piece is 8 cm 5 mm, find the length of the other piece.

5) While drawing a line segment with a length of 12 cm, Seenu has drawn upto 8 cm 7 mm. Find the remaining part to be drawn has to be extend?



6) Kodanda solved the problem like this. Which process has he adopted to solve?

cm	mm
20	8
15	6
<hr/>	
5	2



7) Sunitha estimated the length of one seed as 6 mm. Ramija said if one seed length is 6 mm then the length of 4 seeds is 24 mm. How did Ramija say that?



8) Suraj observed 12 caterpillars moving in a row. He estimated the length of one caterpillar as 3.5 cm. What will be the length of the row? (Estimate)

9) The length of a safety pin is 2 cm. Mary wants to measure 18 cm length by using the safety pin. How many times should she count by moving it in a straight line?



9.2:- Length of the clothes:-



Metres and Centimetres:

Hari and Siri wanted to buy new clothes. They went to a cloth store and bought some pieces of clothe. The shopkeeper gave clothes with the different lengths.

Siri measured the length of the shirt piece as 1 m 50 cm with scale. When she reached 100 cm she made a mark as 1 metre.

We know 1 metre = 100 centimetres

$$\begin{aligned}\text{Measuring 1 metre 50 cm in centimeters} &= 1 \times 100 \text{ cm} + 50 \text{ cm} \\ &= 100 \text{ cm} + 50 \text{ cm} \\ &= 150 \text{ cm}.\end{aligned}$$

Now change the measurement given in the 2nd column into cm.

Dress	Measurement	Measurement in cm
Shirt	1 m 50 cm	150 cm
Pant	1 m 5 cm	
Long skirt	1 m 80 cm	
Blouse	0 m 90 cm	

Converting cm to metres:

Example: When Siri observed length of the blouse as 90 centimetres, she wanted to convert 90 cm into metres.

Solution: The length of the blouse = 90 cm
We know that 1 metre = 100 cm
Converting 90cm to metres = $90/100$
= 0.90 metres.

Do you know?

90 centi-metres = $90 \times \frac{1}{100}$ metres
(in the form of decimal fraction)
= $90/100$ metres
= 0.90 metres

After understanding the concept of decimals, working with measurements is very simple. Like the decimal system, the metric system is also based on units of 10 and its multiples.

After the decimal point, if there is zero at the end, it need not be written.



Example-1: Sanjana used 26 m 15 cm bamboo stick to make a big basket and 12 m 65 cm bamboo stick to make a sieve. Find the total length of bamboo used by her.

Solution:

$$\begin{array}{rcl} \text{Bamboo stick used to make a basket} & = & 26 \text{ m } 15 \text{ cm} \\ \text{Bamboo stick used to make a sieve} & = (+) & 12 \text{ m } 65 \text{ cm} \\ \hline \text{The total length of bamboo stick used} & = & 38 \text{ m } 80 \text{ cm} \end{array}$$

Example-2: Obulesu agreed to construct a school compound wall of length 100 m. He completed 56 m of wall in one week. What length of wall should be constructed further ?

Solution:

$$\begin{array}{rcl} \text{The length of the compound wall} & = & 100 \text{ m} \\ \text{Length of constructed wall} & = (-) & 56 \text{ m} \\ \hline \text{Length of the wall to be completed} & = & 44 \text{ m} \end{array}$$

Example-3: A snail moves 30 cm in a minute. How much distance it can cover in 15 minutes?

Solution: The distance covered by snail in one minute = 30 cm
The distance covered by snail in 15 minutes = 30 cm x 15
= 450 cm or 4 m 50 cm

Example-4: Jyothi weaved a cloth with a length of 1 m 50 cm. If she wants to make it into two parts what will be the length of each part?

Solution: Length of a cloth weaved by Jyothi = 1 m 50 cm
Converting 1 m 50 cm into cm = 1 x 100 cm + 50 cm
= 100 cm + 50 cm
= 150 cm
Making half (two parts) of the cloth = 150 cm ÷ 2
= 75 cm

Exercise - 2

A) Add the following:

- 1) 10 m 75 cm and 6 m 65 cm 2) 85 m 23 cm and 68 m 79 cm

B) Subtract the following.

- 1) 10 m 15 cm from 25 m 25 cm 2) 64 m 45 cm from 100 m

C) Multiply the following.

1) $25\text{ m } 12\text{ cm} \times 9$

2) $102\text{ m } 65\text{ cm} \times 46$

3) $125\text{ m } 83\text{ cm} \times 57$

D) Divide the following.

1) $40\text{ m } 80\text{ cm} \div 16$

2) $100\text{ m } 75\text{ cm} \div 25$

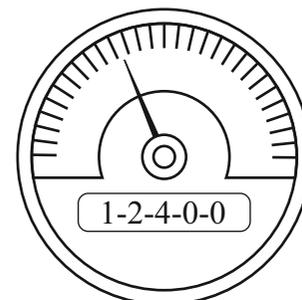
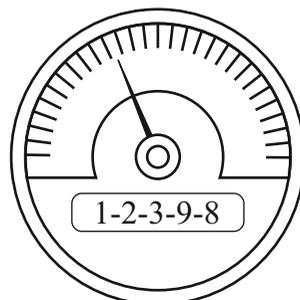
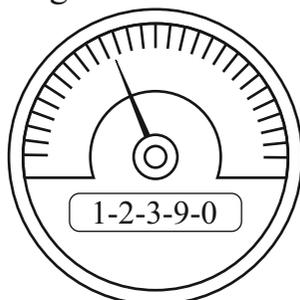
3) $337\text{ m } 5\text{ cm} \div 5$

E) Solve the following problems.

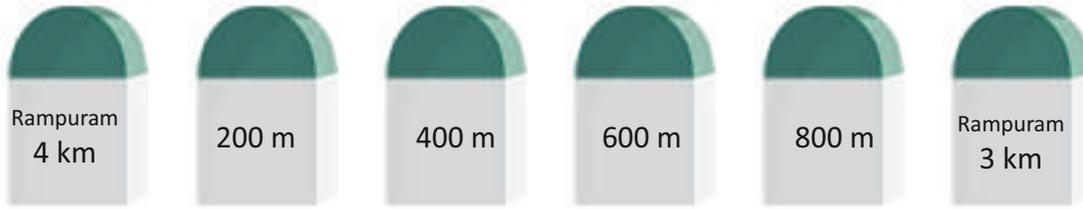
1. Basha tied two sticks with the lengths of 2 m 50 cm and 1 m 75 cm to pluck a mango from a tree. Find the approximate length of the stick he made.
2. Class 5 students joined two ropes with the lengths of 2 m 75 cm and 3 m 75 cm to play tug of war. What is the approximate length of rope they prepared?
3. Class 5 children purchased 45 m colour paper roll to decorate their school on Independence day. They used 43 m 50 cm roll. How much length of roll was remaining?
4. Kiran, an electrician used 45 m 70 cm length of electric wire from 50 metre roll for wiring a house. How much length of wire is left with him?
5. Kumar wants to stitch a saree fall to a 6 m long saree. She has 5 m 50 cm length saree fall. What should be the length of the saree left without saree fall?
6. David used 90 cm cloth to stitch a blouse. To stitch 5 such blouses, how much length of cloth does she need?
7. A caterpillar covers 100 cm distance in a minute. How much distance does it cover in 15 minutes?
8. Swamy shared 20 cm of chocolate bar to 4 members equally. How long will each piece be?
9. Aparna wants to cut 2 m length of cloth pieces to make door curtains from 10 metre cloth. How many curtains can she make?

9.3:- Metres and Kilometres:-

Ravi observed while father driving his bike, the number in the odo-meter changing from 0 to 9. After 9 he observed that when the 0 comes in ones place, the tens place number also changed.



He also observed some mile stones on the road side representing 0.2 km for 200 m, 0.4 for 400 m likewise. When 2 appeared in the odometer Ravi observed that the bike reached the 0.2 marked mile stone and so on.



He calculates that the distance covered by his father's bike.

Ravi converted 6 km into metres after reaching the village.

Example 1: Converting 6 km into metres.

$$1 \text{ km} = 1000 \text{ m}$$

$$6 \text{ km} = 6 \times 1000 \text{ m}$$

$$= 6000 \text{ m}$$

$$1 \text{ km} = 1000 \text{ m}$$

$$\frac{1}{2} \text{ km} = 500 \text{ m (half kilometre)}$$

Example 2 : Convert 3 km and 25 m into metres.

$$1 \text{ km} = 1000 \text{ m}$$

$$3 \text{ km and } 25 \text{ m} = 3 \times 1000 \text{ m} + 25 \text{ m}$$

$$= 3000 \text{ m} + 25 \text{ m}$$

$$= 3025 \text{ m}$$



Exercise - 3

A) Do the following.

- a) Convert 15 km 500 m into metres. b) Convert 128 km into metres.
c) Convert 12690 metres into kilometres. d) Convert 18000 metres into kilometres.

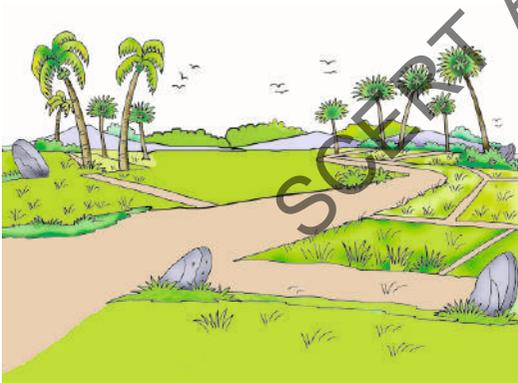
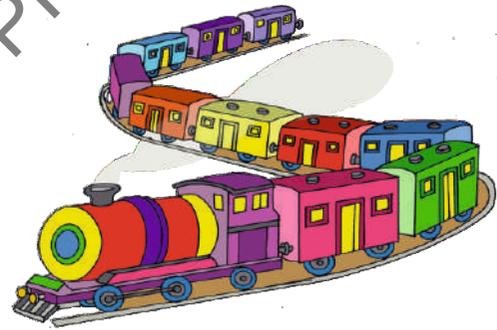
B) Solve the following.

1. A boy comes to school on foot. He has to walk along the path of 400 m beside a pond, 350 m green field and 450 metres road. How much distance has he covered to reach the school? Is it more than 1km?

2. Sitamma used 2.50 m bamboo piece to make a sieve and 1.5 m to make a vase. How much length of bamboo stick has she used to make the articles?



3. Roshan travelled 540 km from Anantapur to Vijayawada via Kurnool. Rakesh travelled 520 km from Anantapur to Vijayawada via Nandyal. Who travelled more? By how many kilometres?
4. Andhra Pradesh Government sanctioned 5.650 km road to a village. The contractor covered 1.250 km . What distance is yet to be covered?
5. Banu bought 5 metres of shirting cloth. She used 1.5 m for her elder son Raheem and 1.2 m for her younger son Kabeer. What is the length of shirting cloth left over?
6. Three benches are arranged in a row. The length of each bench is 1m 15 cm. What is the length of the row?
7. A train covers 50 km distance in an hour. How much distance does it cover in 12 hours if it continues the same speed?



8. Rangaiah wants to fence his field around 1500 m. How many kilometres he has to fence?
9. The diameter of Earth (distance from one side to the other side passing through the centre point) is 12742 km. Find its radius (radius is half of the diameter).



Think & Discuss:

1. How long is the thread in a reel?
2. Can a kite reel be more than 1 km long?
3. Which height can a plane fly?

9.4:- Weight (How heavy? How light):-



Abdul went to a kirana-shop, and spent some time there. He observed the customers and things they were buying.

Write any 5 items usually we buy in kilograms and grams.



Items we buy in kilos	Items we buy in grams

- Abdul : I want to buy 4 rice packets.
- The shop keeper : What type of packets do you buy? Either 25 kg or 10 kg packets.
- Abdul : I want to buy 25 kilo packets.
- The Shop-keeper : If you buy four such packets it will be one quintal.
Abdul calculated it. $4 \times 25 \text{ kg} = 100 \text{ kg}$
- Abdul : What is a ton?
- The shopkeeper : The weight of 10 quintals is one ton.
So $1 \text{ ton} = 10 \times 100 = 1000 \text{ kg}$

1 quintal = 100 kg

1 ton = 1000 kg

Do this

Fill in the blanks with kilos or grams. (One is done for you)

- 1) My friend weighs 38 Kg
- 2) A packet of rice weighs 50 _____
- 3) My pen weighs 20 _____
- 4) My school bag weighs 3.5 _____
- 5) A tube of gum weighs 100 _____
- 6) My empty water bottle weighs _____



Here are some example to convert kilogram into gram and vice versa.

Ex-1: Convert 5 kilograms into grams.

Solution: 1 kilogram = 1000 grams

$$\begin{aligned}\therefore 5 \text{ kilos} &= 5 \times 1000 \text{ grams} \\ &= 5000 \text{ grams}\end{aligned}$$

Ex-2: Convert 3kg 5 grams into grams.

Solution: 1 kilo = 1000 grams

$$\begin{aligned}&= 3\text{kg } 5\text{g} = 3 \times 1000 \text{ grams} + 5 \text{ grams} \\ &= 3005 \text{ grams}\end{aligned}$$

Ex-3 Convert 3000 grams into kilograms.

Solution: 1000 grams = 1 kilogram

$$\begin{aligned}3000 \text{ grams} &= 3000/1000 \text{ kilograms} \\ &= 3 \text{ kilograms}\end{aligned}$$

Ex-4: Convert 5040grams into kilograms.

Solution: 1000 grams = 1 kilogram

$$\begin{aligned}5040 \text{ grams} &= 5040/ 1000 \text{ kilograms} \\ &= 5 \text{ kilogram } 40 \text{ grams}\end{aligned}$$

Do these

1. Convert the kilograms into grams.

(Note: 1 kilogram = 1000grams)

- | | | |
|----------------|---------------|----------------|
| 1) 3 kilograms | 2) 34 kilos | 3) 17 kg 600 g |
| 4) 38 kg 720g | 5) 89 kg 540g | |

2. Convert grams into kilograms

- | | | |
|------------|-----------|-----------|
| 1) 6000 g | 2) 7090 g | 3) 8069 g |
| 4) 12405 g | 5) 2418 g | |



Exercise - 4**1. Add the following:**

- a) 13 kg 420 g and 24 kg 600 g b) 79 kg 969 g and 98 kg 327 g

2. Subtract the following:

- a) 235 kg 250 g from 355 kg 450 g b) 21 kg 62 g from 160 kg 330 g

3. Multiply the following:

- a) 8 kg 750 g x 12 b) 475 kg x 16 c) 9850 g x 25

4. Make the divisions:

- a) 7500 kg \div 20 b) 6600 g \div 15 c) 150 kg 30 g \div 30



5. Subbaiah harvested 120 kg ladiesfingers, 520 kg ridge gourds and 150 kg tomatoes. How much weight of vegetables has he yielded?
6. Farhana purchased 2 kg 500 g laddoos, 1 kg honey cake, 750 g jamoon and 500 g jilebi. How much weight of sweets has she purchased?
7. Helen buys a school bag that weighs 700 g. After keeping the class books in her bag it weighs 3 kgs. Find the weight of the books.
8. Shafi purchases 22 kg idly ravva for his canteen. If he used 18 kg 500 g ravva in one day, how much ravva will be left with him?
9. Samson lifted 150 kg weight and Somi Reddy lifted 2 quintals. Who lifted heavier weights? By how much more weight?
10. A worker in a biscuit factory has to pack 25.500 kg biscuits in a carton. What will be the weight of 15 cartons of biscuits?
11. Sarala uses 50 g coffee powder in a week for household. How much coffee powder should Sarala buy for one month? (approximately)
12. Sarma packs food packets 550 g each. If he packs 20 such food packets. How much food has he packed?
13. A piece of wood weighs 24 kg. The wood cutter wants three equal pieces from it. How much weight each piece would it be?
14. I have 10 packets of rice that weigh 500 kgs. What is the weight of one packet?
15. A vegetable seller sells 3 kilos of brinjals for 60. What is the cost of one kilo brinjals?

Think & Discuss:

In how many ways can a vegetable vendor weigh 1 kilo beans by using the weights 500 g, 200 g, 100 g and 50 g ? (Use the weights second time if needed.)

Project:

Making sample weights with sand and cover or with empty paste tubes and sand. (Go to a grocery shop. Bring the weights. Use the weights and prepare same weights with sand and cover.)

Do you know?

Converting 3 kilograms into milligrams.

Kilogram = $1 \times 1,000$ grams, 1 gram = $1 \div 1,000$ kilograms

Kilo means 1,000

Milli means $1 \div 1,000$ (thousandth part of a gram)

First we have to change kilo to grams

3 kilograms going to equal 3 times to 1,000 grams. That equals 3,000 grams.

1 milligram is equal to $1 \div 1,000$ grams (vice versa 1 gram = 1,000 mg)

So $3,000 \text{ g} = 3,000 \times 1,000$ milli grams = 30,00,000 milli grams.

9.5:- Sharing payasam in Litres and milliliters:-

The animals in the forest want to celebrate

'Forest animals' day'.

It is announced that all the animals have to attend the celebrations.



To make the occasion special it is suggested to prepare payasam for everyone. The king of the jungle announced that it will sponsor the payasam for everyone.

On that day

The elephant drank _____ litres.

The tiger drank _____ litres.

The squirrel wanted only 500 millilitres. The cat poured the payasam in one litre bottle. The fox was angry and shouts at the cat for wasting.

How much payasam will be wasted? _____

All the animals enjoyed the payasam. At last a group of ants came. The cat felt sad. The payasam was finished. The elephant said no need to feel sad.

The ants will drink only a little. So the left over in the one litre bottle which squirrel drank is enough them.

Can you guess which animal can drink highest quantity of Payasam?

Who drinks least quantity of Payasam?

Use the appropriate unit (Litre or milliliter) for the following:

Tea in a teacup _____ Shampoo in a sachet _____

Cough Syrup in the spoon _____ Water in a water tank _____

Oil in oil packet _____ Water in a bucket _____

The fox drank 2 L payasam. Now the squirrel wants to measure it in millilitres. Now let's convert 2 L into milliliters.

Solution:

The payasam drank by the fox = 2 L

Measuring 2L in millilitres = 2 x 1000 ml

= 2000 ml

We know that 1L = 1000 ml

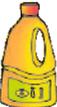
Exercise - 5**1. Convert the following into millilitres:**

- 1) 5 L 2) 15 L 3) 38.5 L 4) 82.7 L

2. Compare the given measurements by using <, > and = symbols.

1. 200 ml 100 ml + 100 ml + 100 ml
 2. 3 L 500 ml + 500 ml
 3. 100 L 20 L + 20 L + 10 L + 50 L
 4. 150 ml 50 ml + 60 ml + 20 ml
 5. 20 ml 5 ml + 2 ml + 15 ml

3. Calculate the capacity.

1.  150 ml =  Capacity of each cup is _____
2.  1 L =  Capacity of each small bottle is _____
3.  500 ml =  Capacity of each can is _____
4.  600 ml =  Capacity of each tumbler is _____

4. Add the following:

- 1) 12 L 100 ml and 8 L 725 ml 2) 93 L 450 ml and 675 ml
 3) 33 L 823 ml and 45 L 202 ml 4) 15 L and 500 ml

5. Subtraction:

- 1) 83 L 103 ml from 98 L 208 ml 2) 16 L 540 ml from 75 L 725 ml
 3) 2 L 208 ml from 10 L 425 ml 4) 33 L 98 ml from 42 L 250 ml

6. Nagaraju used 2 L 220 ml blue paint, 3 L 500 ml white paint and 750 ml red paint to paint a house. How much paint did he use?



7. Samson has a cow and a buffalo. Cow gives 3 L 500 ml of milk and the buffalo gives 5 L 680 ml of milk per day. How much milk did Samson get from both of them?



8. A milkman sells 20 litres of milk to a tea stall. Tea seller uses 15 L 125 ml milk to make tea. How much milk is left in the can?



9. An old model toilet flushes 8 litres of water. Modern toilet flushes 3.5 L of water. How many litres of water we can save for each flush with modern toilet?

10. An elephant drinks 190 litres of water per day. How many litres does it drink in one month? (31 days)



11. John sells one ice cream cup containing 150 ml ice cream. If he sells 18 such ice cream cups, find the total capacity of ice cream?



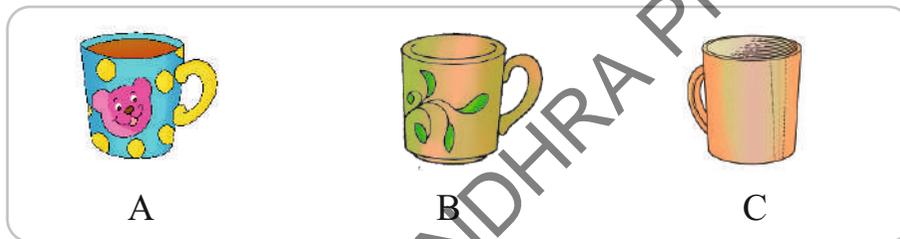
12. A juice bottle contains 2.2 L of juice. How many 200ml glasses are needed to pour it completely?

13. Reshma observed that one shampoo sachet contains 5 ml shampoo. To fill 400 ml bottle how many sachets are needed?



Find the answer (Fun Maths)

Observe the pictures, follow the instructions and find out the answer.



The amount of milk in mug A is 300 ml more than that in B
 The amount of milk in mug B is 400 ml less than that in C.
 The amount of milk in mug C is 100 ml more than that in A.
 Find the amount of milk in three mugs. (Mug B is having 700 ml.)



Project: Collect the following information from your class students and fill in the table.

S. No.	Name of the student	Height	Weight of his / her bag	Water in his bottle
1.				
2.				
3.				
4.				
5.				



10.1:- AM and PM:-

Mahitha's sister attended an interview in Rajahmundry and returned home in Eluru that evening.

Mahitha : How was your Journey?

Sister : It took **2 hours** to Rajahmundry and **105 minutes** for the return journey.

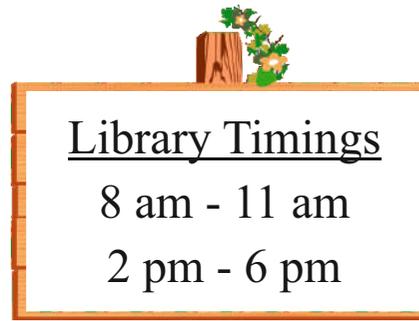
Mahitha : You mean it took **120 minutes** to go to Rajahmundry, **1 hour 45 minutes** for the return journey.

Sister : Yes.

Try these

1. Mahitha's sister started at 6:30 in the morning and travelled for 2 hours. What time did she reach Rajahmundry?
2. Mahitha's sister started at 3:00 in the afternoon and travelled for 1 hour 45 minutes. At what time did she reach Eluru?
3. How much time did she take for the travel? (to and fro)

Mahitha observed the timing board of a library and got confused about AM, PM while returning from school. She asked her sister for clarification.



Library Timings
8 am - 11 am
2 pm - 6 pm



Sister : The time from midnight 12 O' clock to 12 noon is written as **am** and time from noon to midnight is written as **pm**.

These are shortened form of 'Ante Meridian' and 'Post Meridian'.

am Ante Meridian

pm Post Meridian

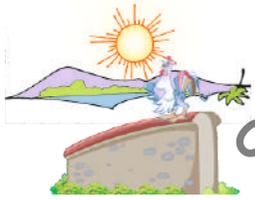
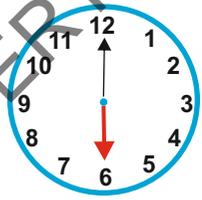
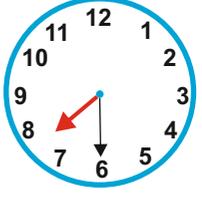
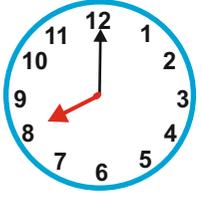
❖ Now can you tell the working hours of the Library?

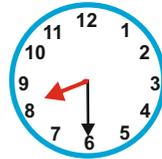
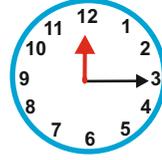
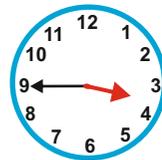
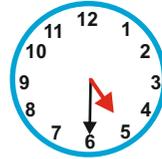
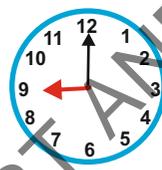
am: Before 12 Noon. It means from midnight 12 to before 12 noon.

pm: After 12 Noon. It means from 12 noon to before midnight 12.

Activity - 1

Look at the event, observe the clock and decide its time **am** or **pm**. Note it in the correct box.

		am	pm
		am	pm
		am	pm

		am	pm
		am	pm
		am	pm
		am	pm
		am	pm
		am	pm

Do this

Children ! fill in the table with your daily life activities.

Daily activity	Time	am / pm
eg : Wake up time	06:00	am



Railway Station Digital clock [18 : 06]

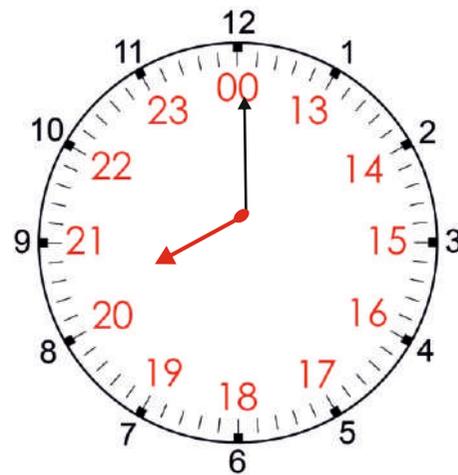
By the time Raju and his father entered into the railway station, Raju observed the digital clock is displaying 18:06 hours. He got confused and asked his father.

Father : We use 12 hours format but the railway department uses 24 hours format. This helps to confirm whether arrival or departure of a train is after noon or before noon.

Raju : So we use 24 hours format because we have 24 hours per a day. Am I right?

Father : Yes, you are right.

In 12 hour clock we read the time after 12 noon as 1 pm, but in 24 hour clock we read as $1 + 12 = 13$, 13 hours. Similarly we read 3 pm as $3 + 12 = 15$, 15 hours. With 12 hour clock the pm time is found by adding 12 hours to the time show in the clock.



Time → 24 hour clock time	Time → 24 hour clock time
1 : 00 am → 01: 00 Hours	2 : 00 pm → 14: 00 Hours
5 : 00 am → 05: 00 Hours	6 : 00 pm → 18: 00 Hours
7 : 00 am → 07: 00 Hours	9 : 00 pm → 21: 00 Hours
10 : 00 am → 10: 00 Hours	11 : 00 pm → 23: 00 Hours
12 : 00 Noon(pm)→ 12: 00 Hours	12 : 00 Midnight(am)→00: 00 Hours

Example :

		H	M
1. 12 hours time	24 hours time.		3 : 00
3 pm = 3 + 12:00	= 15:00 hours		+12 : 00
			15 : 00
2. 9:30pm = 9:30 + 12:00	= 21 : 30 hours	H	M
			9 : 30
			+ 12 : 00
			21 : 30

Do this

Match the following:

12 Hours	24 Hours
9:40 AM	23 : 40 Hours
3:20 PM	6 : 25 Hours
6:25 AM	15 : 20 Hours
6:25 PM	9 : 40 Hours
11:40 PM	18 : 25 Hours

Mention the time of your choice and convert into 24 hours time.

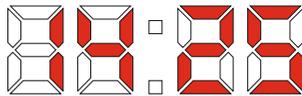
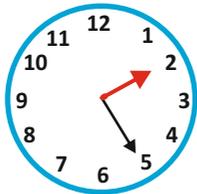
The departure and arrival times of the trains from Vijayawada to the various stations are given below. Write the total time of the journey from Vijayawada to destination.

<i>Name of the Train</i>	<i>Departure time</i>	<i>Arrival Time</i>	<i>Time taken for the Journey</i>
Ratnachal Expres	6:05 AM	12:10 PM	
(Vijayawada – Visakhapatnam)			
Tirupati A/C double decker	3:55 AM	11:35 PM	
(Vijayawada – Tirupathi)			
Coramandal Express	9:55 AM	17:00 PM	
(Vijayawada – Chennai)			

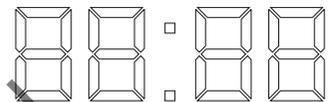
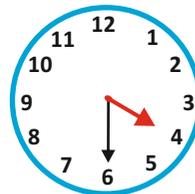
Exercise - 1

- 1) Colour the digital clock in 24 hours format by observing the given 12 hours analog clock.

2:25 pm



4:30 pm



- 2) Sports competitions were held in Kondepadu school from 10:45 am to 3:45 pm. For how many hours was the program held?
- 3) Robert is leaving for Singapore from Vijayawada at 22:00 hours. Express this time in 12 hours format.
- 4) Abhinav was a night watch-man in a school. He used to attend his duty at 5:30pm. Express this time in 24 hours format.
- 5) Every day Himadas practises Yoga from 4:30 am to 6:15 am and from 4:00 pm to 5:30 PM. Find the total time she spends for her practises every day?
- 6) While Babu's team was learning to play Kabaddi, on Monday they practiced from 6:15 am to 7:05 am. On Tuesday they practiced 3:25 pm to 4:15. How many minutes did they practice in both days?
- 7) The bus departs from the terminal at 11.20am and arrives the destination at the 2:40 pm. How long did the bus travel?
- 8) Sneha began her home work at 4:30pm. She worked for 80 minutes. At what time did she finish?

Project work:

Collect the time at which your parents and your friends' parents start from home (AM) for their work, and the time they return home (PM) from work. Calculate the total time they spent for their work in a single day.

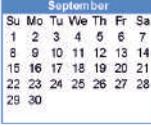
S.No	Name of parent	Starting time	Returning time	Total time

10.2:- Leap year:- Do you know:

Teacher : Our Ex Prime Minister late Morarji Desai was born on 29.02.1896. Can anyone tell me the speciality of this date?

Saleem : We have normally 28 days in February, but here we have 29th day.

Teacher : Good Saleem! February is different from remaining 11 months. It contains 28 or 29 days. Because every four years February month has an extra day. The year in which February gets this extra day is called “leap year”. Observe the 2019 and 2020 calendars.

2019						
						
2020						
						

Total number of days in 2019, 2020

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
2019	31	28	31	30	31	30	31	31	30	31	30	31	365
2020	31	29	31	30	31	30	31	31	30	31	30	31	366

- ❖ 2019 February has 28 days and the year consists of 365 days.
- ❖ In 2020 February has 29 days and year consists of 366 days.
- ❖ Here, in 2020 February consists one extra day so, that year has 366 days.
- ❖ The year which consists of 366 days is called “a leap year.” 2020 is a leap year. 2019 has 365 days. So it is a non leap year. Generally for every four years we get a leap year. (Ask your teacher for the reason)

Year	Days	Leap Year	Days
2001	365	2004	366
2002	365	2008	366
2003	365	2012	366
2005	365	2016	366



In general, a leap year is divisible by '4' and a non leap year is not divisible by '4'. Though century years, like 1800, 1900, 2100, 2200 etc., are divisible by '4' but these are non leap years.

The century year is called leap year only when it is divisible by 400. (ask your teacher for the reason)

Exercise - 2

1. 2020 is a leap year, so the next leap year is _____
2. The leap year before 2020 is _____
3. Is 2300 a leap year? Justify your answer.
4. Take the calendar of any year of your choice; add the days in all the 12 months. Is it a leap year or not?
5. Morarji Desai was born on 29.02.1896 and passed away on 10.04.1995. How many birthdays did he celebrate?
6. The famous Mathematician Srinivasa Ramanujan was born on 22.12.1887 and passed away on 26.04.1920. How many leap years were there in his life period?

Glossary

Recall	- జ్ఞప్తికి తెచ్చుకొను
Announcement	- ప్రకటన
Debit	- బ్యాంకు ఖాతా నుంచి పోయిన సొమ్ము
Credit	- బ్యాంకు ఖాతా లోనికి వచ్చిన సొమ్ము
Balance	- జమా / ఖర్చుల తరువాత మిగిలినది
Grocery shop	- కిరాణా సరుకులు అమ్మే దుకాణం
Compartment	- రైలు పెట్టె / రైలు బోగీ
Previous	- దీని కన్నా ముందరిది
Concentric circles	- ఏక కేంద్ర వృత్తాలు
Mean while	- ఇంతలో
Numeration	- లెక్కింపు
Lakh	- లక్ష
Crore	- కోటి
Standard form	- ప్రామాణిక రూపం
Representation	- ప్రాతినిధ్యపరుచుట
Extended	- విస్తరించుట
Individual	- వ్యక్తిగతమైనవి
Widely	- ఎక్కువగా, విస్తారంగా
Slightly	- కొంచెంగా, తక్కువగా
Addition	- కూడిక
Subtraction	- తీసివేత
Seed bed	- నారుమడి
Transplantation	- నాటుట
Fertilizers	- ఎరువులు
Pesticides	- పురుగు మందులు
Harvesting	- కోత కోయుట
Pile	- కుప్ప
Thrash	- మార్చడం
Expenditure	- ఖర్చు

Diary form	- పాల ఉత్పత్తి కేంద్రం
Addition properties	- కూడిక ధర్మాలు
Greatest	- పెద్దది
Smallest	- చిన్నది
Estimation	- అంచన
Difference	- భేదం
Profit	- లాభం
Loss	- నష్టం
Cost price	- కొన్న వెల
Selling price	- అమ్మిన వెల
Multiplicand	- గుణకము
Multiplier	- గుణ్యము
Product	- లబ్ధము
Divisor	- విభాజకం
Dividend	- విభాజ్యం
Quotient	- భాగఫలం
Remainder	- శేషం
Iron beams	- లావుపాటి ఇనుస ఊచలు
Labour wage	- పని కూలీ
Scavenger	- చెత్త మరియు మరుగుదొడ్లు ఊడ్చే కూలీ
Algorithm	- వరుస క్రమం
Whole seller	- టోకు వ్యాపారి
Point	- బిందువు
Line segment	- రేఖా ఖండం
Ray	- కిరణము
Line	- సరళరేఖ (రేఖ)
Infinite	- అనంతము
Shortest	- అతి దగ్గర
Distinct	- భిన్నమైన (వేర్వేరు)
Tiny	- అతి చిన్న
Sun rays	- సూర్య కిరణాలు
End -points	- చివరి బిందువులు

Angle	- కోణము
Right angle	- లంబ కోణము
Acute angle	- అల్ప కోణం
Obtuse angle	- అధిక కోణం
Horizontal	- భూమికి సమాంతరంగా
Vertical	- భూమికి నిట్ట నిలువుగా
Vertex	- శీర్షము
Arm	- భుజం (అంచు)
Curve	- వక్రము
Symmetry	- సౌష్ఠ్యం
Adjacent	- ప్రక్కన
Rotation	- భ్రమణము
Mirror image	- ప్రతి బింబము
Perimeter	- చుట్టుకొలత
Area	- వైశాల్యం
Boundary	- చుట్టూ
Length	- పొడవు
Breadth	- వెడల్పు
Multiples	- గుణిజాలు
Factors	- కారణాంకాలు
Divisible	- భాగించు
Even numbers	- సరి సంఖ్యలు
Digital root	- అంక మూలం
Unit place	- ఒకట్ల స్థానం
Common multiples	- ఉమ్మడి గుణిజాలు
Least common multiples (LCM)	- కనిష్ట సామాన్య గుణిజం
Prime numbers	- ప్రధాన సంఖ్యలు
Composite numbers	- సంయుక్త సంఖ్యలు
Common factors	- ఉమ్మడి కారణాంకాలు
Highest common factor (HCF)	- గరిష్ట సామాన్య కారణాంకం
Data	- దత్తాంశం / సమాచారం

Tally marks	- గణన చిహ్నాలు
Picto graph	- పట చిత్రం
Bar graph	- కమ్మీ చిత్రం
Pet animals	- పెంపుడు జంతువులు
Census	- జనాభా గణన
Proper fraction	- క్రమ భిన్నం
Mixed fraction	- మిశ్రమ భిన్నం
Portion	- భాగం
Simplest form	- కనిష్ట రూపం / సూక్ష్మ రూపం
Unlike fractions	- విజాతి భిన్నాలు
Strip	- బద్దీ
Decimal form	- దశాంశ రూపం
Thirsty	- డప్పిక
Squeeze	- పిండటం
Thickness	- మందము
Adjacent	- పక్క పక్కన
Bamboo stick	- వెదురు కర్ర
Snail	- నత్త
Cater pillar	- గొంగళి పురుగు
Odometer	- దూరాన్ని కొలిచే సాధనం
Diameter	- వృత్త వ్యాసం
Radius	- వ్యాసార్థం
Ante meridian (A.M.)	- రాత్రి 12 గంటల నుంచి మధ్యాహ్నం 12 గంటల వరకు మధ్య సమయం
Post meridian (P.M.)	- మధ్యాహ్నం 12 గంటల నుంచి రాత్రి 12 గంటల వరకు మధ్య సమయం
Leap year	- ఫిబ్రవరి నెలలో 29 రోజులు గల సంవత్సరం
Century year	- శత సంవత్సరం
12 hours format	- 12 గంటల సమయం
24 hours format	- 24 గంటల సమయం